

T3, E3, T1, E1 Controller Commands on the Cisco ASR 9000 Series Router

This module provides command line interface (CLI) commands for configuring T3/E3 and T1/E1 controllers on the Cisco ASR 9000 Series Router.

To use commands of this module, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using any command, contact your AAA administrator for assistance.

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bert e1

To start or stop a configured bit error rate test (BERT) on an E1 controller or channel group, use the **bert e1** command in EXEC mode . To return to the default state, use the **no** form of this command.

bert e1 *interface-path-id* [**channel-group** *channel-group-number*] [**error**] {**start** | **stop**}

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
channel-group *channel-group-number*	(Optional) Channel group number. When an E1 data line is configured, channel group numbers can be values from 0 to 30. **Note** For any of the DS0 time slots within the time slot range provided for the channel group, use time slot -1 as the channel number.
error	(Optional) Injects errors into the running BERT stream.
start	Starts the BERT on the E1 controller or channel.
stop	Stops the BERT on the E1 controller or channel.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 4.0.0	This command was introduced

Usage Guidelines

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack*/*slot*/*module*/*port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Note Before you can start a BERT on an E1 controller or channel group, you must configure a BERT pattern using the **bert pattern** command. If desired, you can also adjust the default setting (1 minute) of the BERT interval using the **bert interval** command. Both of these commands are available in E1 configuration mode and channel group configuration mode.

To view the BERT results, use the **show controllers e1** command in EXEC mode . The BERT results include the following information:

- Type of test pattern selected
- Status of the test
- Interval selected
- Time remaining on the BERT
- Total bit errors
- Total bits received

BERT is data intrusive. Regular data cannot flow on a line while the test is in progress. The line is put in an alarm state when a BERT is in progress and restored to a normal state after a BERT has been terminated.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to start and stop a BERT on an E1 controller:

```
RP/0/RSP0/CPU0:router# bert e1 0/3/0/0 start
RP/0/RSP0/CPU0:router# bert e1 0/3/0/0 stop
```

The following example shows how to inject errors into the BERT stream on an E1 controller:

```
RP/0/RSP0/CPU0:router# bert e1 0/3/0/0 error
```

Related Commands

Command	Description
bert interval, on page 9	Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line.
bert pattern, on page 11	Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.
show controllers e1, on page 81	Displays information about the E1 links and hardware and software drivers for the E1 controller.

bert e3

To start or stop a configured bit error rate test (BERT) on an E3 controller or channel group, use the **bert e3** command in EXEC mode . To return to the default state, use the **no** form of this command.

bert e3 *interface-path-id* [**error**] {**start** | **stop**}

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
error	(Optional) Injects errors into the running BERT stream.
start	Starts the BERT on the E3 controller or channel.
stop	Stops the BERT on the E3 controller or channel.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack*/*slot*/*module*/*port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Note Before you can start a BERT on an E3 controller, you must configure a BERT pattern using the **bert pattern** command. If desired, you can also adjust the default setting (1 minute) of the BERT interval using the **bert interval** command. Both of these commands are available in E3 configuration mode.

To view the BERT results, use the **show controllers e3** command in EXEC mode . The BERT results include the following information:

- Type of test pattern selected
- Status of the test
- Interval selected
- Time remaining on the BERT
- Total bit errors
- Total bits received

BERT is data intrusive. Regular data cannot flow on a line while the test is in progress. The line is put in an alarm state when a BERT is in progress and restored to a normal state after a BERT has been terminated.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to start and stop a BERT on an E3 controller:

```
RP/0/RSP0/CPU0:router# bert e3 0/3/0/0/0 start
RP/0/RSP0/CPU0:router# bert e3 0/3/0/0/0 stop
```

The following example shows how to inject errors into the BERT stream on an E3 controller:

```
RP/0/RSP0/CPU0:router# bert e3 0/3/0/0 error
```

Related Commands

Command	Description
bert interval, on page 9	Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line.
bert pattern, on page 11	Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.
show controllers e3, on page 84	Displays information about the E3 links and hardware and software drivers for the E3 controller.

bert error

To insert errors into a BERT stream on a T3/E3 or T1/E1 line, use the **bert error** command in T3 or T1 configuration mode. To disable a BERT pattern, use the **no** form of this command.

bert error [*number*]

Syntax Description

number	Specifies the number of BERT errors to introduce into the bit stream. The range is from 1 to 255. The default is 1.

Command Default

The default is 1.

Command Modes

T3 configuration

E3 configuration

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 and E1 configuration modes was added.

Usage Guidelines

Use the **bert error** command with the **bert pattern** command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to insert 10 errors into the BERT bit stream on the T3 controller in slot 0, subslot 3:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/0/3/1/10
RP/0/RSP0/CPU0:router(config-t3e3)# bert error 10
```

Related Commands

Command	Description
bert interval, on page 9	Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line.
bert pattern, on page 11	Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.

Command	Description
show controllers e1, on page 81	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers e3, on page 84	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t1, on page 91	Displays information about the T1 links and hardware and software drivers for the T1 controller.
show controllers t3, on page 98	Displays information about the T3 links and hardware and software drivers for the T3 controller.

bert interval

To specify the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line, use the **bert interval** command in the appropriate configuration mode. To revert to the default interval, use the **no** form of this command.

bert interval *time*

Syntax Description

time	Duration (in minutes) of the BERT. The interval can be a value from 1 to 14400. The default is 1 minute.

Command Default

A BERT runs for 1 minute.

Command Modes

T3 configuration

E3 configuration

T1 configuration

E1 configuration

Channel group configuration for T1 and E1

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 and E1 configuration mode was added.

Usage Guidelines

Use the **bert interval** command with the **bert pattern** command. If the **bert interval** command is not used, then the BERT runs for a default of 1 minute.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to limit the BERT to 10 minutes on the T3 controller in slot 0, subslot 3:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/0/3/1/10
RP/0/RSP0/CPU0:router(config-t3e3)# bert interval 10
```

Related Commands

Command	Description
bert error, on page 7	Insert errors into a BERT stream on a T3/E3 or T1/E1 line.
bert pattern, on page 11	Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.

Command	Description
show controllers e1, on page 81	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers e3, on page 84	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t1, on page 91	Displays information about the T1 links and hardware and software drivers for the T1 controller.
show controllers t3, on page 98	Displays information about the T3 links and hardware and software drivers for the T3 controller.

bert pattern

To enable a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line or an individual channel group, use the **bert pattern** command in T3, E3, T1, E1, or channel group configuration mode. To disable a BERT pattern, use the **no** form of this command.

bert pattern {**0s** | **1in8** | **1s** | **2^11** | **2^15** | **2^20** | **2^20-QRSS** | **2^23** | **2^9** | **3in24** | **55Daly** | **55Octet** | **alt-0-1** | **ds0-1** | **ds0-2** | **ds0-3** | **ds0-4**}

Syntax Description

0s	Invokes a repeating pattern of zeros (...000...).
1in8	(T1 and E1 only) Invokes a repeating pattern of one (1) bit in eight (8).
1s	Invokes a repeating pattern of ones (...111...).
2^11	(Channel group only) Invokes a pseudorandom O.151 test pattern that is 32,768 bits in length.
2^15	Invokes a pseudorandom O.151 test pattern that is 32,768 bits in length.
2^20	Invokes a pseudorandom O.153 test pattern that is 1,048,575 bits in length.
2^20-QRSS	Invokes a pseudorandom quasi-random signal sequence (QRSS) 0.151 test pattern that is 1,048,575 bits in length.
2^23	Invokes a pseudorandom O.151 test pattern that is 8,388,607 bits in length.
2^9	(Channel group only) Invokes a pseudorandom 0.153 test pattern of 511 bits in length.
3in24	(T1 and E1 only) Invokes a repeating pattern in which three (3) bits in twenty-four (24) are set to one (1) and the others are set to zero (0).
55Daly	(T1 and E1 only) Invokes a repeating pattern of fifty-five (55) 8-bit octets of data. This pattern introduces rapid transitions from long sequences of low-density octets to high-density octets, high-density octets to low-density octets, and rapid 1010 bit transitions.
55Octet	(T1 and E1 only) Invokes a repeating pattern of fifty-five (55) 8-bit octets of data. This pattern has fifteen (15) consecutive zeros.
alt-0-1	Invokes a repeating pattern of alternating zeros and ones (...01010...).
ds0-1	(Channel group only) Invokes a repeating sequence of 100x FFh, followed by 100x 00h. This combination of minimum and maximum densities causes stressing of the signal recovery circuitry.
ds0-2	(Channel group only) Invokes a repeating sequence of 100x 7Eh, followed by 100x 00h. This combination provides minimum ones density stressing as well as Layer 2 flag bytes.
ds0-3	(Channel group only) Invokes a repeating sequence of 200x 4Ch. This combination represents the typical SDD traffic patterns.
ds0-4	(Channel group only) Invokes a repeating sequence of 200x 40h. This combination represents the typical DEC VT traffic.

Command Default

BERT pattern test is disabled

Command Modes

T3 configuration

E3 configuration

T1 configuration

E1 configuration

Channel group configuration for T1 and E1

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	• Support for E3 and E1 configuration mode was added. • Support for the **ds0-1**, **ds0-2**, **ds0-3**, and **ds0-4** keywords was added.

Usage Guidelines

BERT is supported on each of the T3/E3 or T1/E1 links. It is done only over an unframed T3/E3 or T1/E1 signal and is run on only one port at a time. It is also supported on an individual channel group.

To begin a BERT, commit the configuration and use the **bert t1**, **bert e1**, **bert t3**, or **bert e3** command in EXEC mode.

To view the BERT results, use the **show controllers t1** or **show controllers t3** command in EXEC mode. The BERT results include the following information:

- Type of test pattern selected
- Status of the test
- Interval selected
- Time remaining on the BERT
- Total bit errors
- Total bits received

BERT is data intrusive. Regular data cannot flow on a line while the test is in progress. The line is put in an alarm state when a BERT is in progress and restored to a normal state after a BERT has been terminated.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to enable the running of a BERT pattern of all zeros on the T3 controller in slot 0, subslot 3:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/0/3/1/10
RP/0/RSP0/CPU0:router(config-t3e3)# bert pattern 0s
```

Related Commands

Command	Description
bert error, on page 7	Insert errors into a BERT stream on a T3/E3 or T1/E1 line.
bert interval, on page 9	Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line.
show controllers e1, on page 81	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers e3, on page 84	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t1, on page 91	Displays information about the T1 links and hardware and software drivers for the T1 controller.
show controllers t3, on page 98	Displays information about the T3 links and hardware and software drivers for the T3 controller.

bert t1

To start or stop a configured bit error rate test (BERT) on a T1 controller or channel group, use the **bert t1** command in EXEC mode .

bert t1 *interface-path-id* [**channel-group** *channel-group-number*] [**error**] {**start** | **stop**}

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
channel-group *channel-group-number*	**Note** (Optional) Channel group number. When a T1 data line is configured, channel group numbers can be values from 0 to 23.
error	(Optional) Injects errors into the running BERT stream.
start	Starts the BERT on the T1 controller or channel.
stop	Stops the BERT on the T1 controller or channel.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack*/*slot*/*module*/*port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Note Before you can start a BERT on a T1 controller or channel group, you must configure a BERT pattern using the **bert pattern** command. If desired, you can also adjust the default setting (1 minute) of the BERT interval using the **bert interval** command. Both of these commands are available in T1 configuration mode and channel group configuration mode.

To view the BERT results, use the **show controllers t1** command in EXEC mode mode. The BERT results include the following information:

- Type of test pattern selected
- Status of the test
- Interval selected
- Time remaining on the BERT
- Total bit errors
- Total bits received

BERT is data intrusive. Regular data cannot flow on a line while the test is in progress. The line is put in an alarm state when a BERT is in progress and restored to a normal state after a BERT has been terminated.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to start and stop a BERT on a T1 controller:

```
RP/0/RSP0/CPU0:router# bert t1 0/3/0/0/0 start
RP/0/RSP0/CPU0:router# bert t1 0/3/0/0/0 stop
```

The following example shows how to inject errors into the BERT stream on an T1 controller:

```
RP/0/RSP0/CPU0:router# bert t1 0/3/0/0 error
```

Related Commands

Command	Description
bert interval, on page 9	Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line.
bert pattern, on page 11	Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.
show controllers t1, on page 91	Displays information about the T1 links and hardware and software drivers for the T1 controller.

bert t3

To start or stop a configured bit error rate test (BERT) on a T3 controller or channel group, use the **bert t3** command in EXEC mode .

bert t3 *interface-path-id* [**error**] {**start** | **stop**}

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
error	(Optional) Injects errors into the running BERT stream.
start	Starts the BERT on the T3 controller or channel.
stop	Stops the BERT on the T3 controller or channel.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack*/*slot*/*module*/*port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Note Before you can start a BERT on a T3 controller, you must configure a BERT pattern using the **bert pattern** command. If desired, you can also adjust the default setting (1 minute) of the BERT interval using the **bert interval** command. Both of these commands are available in T3 configuration mode.

To view the BERT results, use the **show controllers t3** command in EXEC mode . The BERT results include the following information:

- Type of test pattern selected
- Status of the test
- Interval selected
- Time remaining on the BERT
- Total bit errors
- Total bits received

BERT is data intrusive. Regular data cannot flow on a line while the test is in progress. The line is put in an alarm state when a BERT is in progress and restored to a normal state after a BERT has been terminated.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to start and stop a BERT on a T3 controller:

```
RP/0/RSP0/CPU0:router# bert t3 0/3/0/0 start
RP/0/RSP0/CPU0:router# bert t3 0/3/0/0 stop
```

The following example shows how to inject errors into the BERT stream on a T3 controller:

```
RP/0/RSP0/CPU0:router# bert t3 0/3/0/0 error
```

Related Commands

Command	Description
bert interval, on page 9	Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line.
bert pattern, on page 11	Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.
show controllers t3, on page 98	Displays information about the T3 links and hardware and software drivers for the T3 controller.

cablelength

To specify the distance of the cable from the routers to the network equipment, use the **cablelength** command in T3 or E3 configuration mode. To restore the default cable length, use the **no** form of this command.

cablelength *feet*

Syntax Description

feet	Number of feet in the range from 0 to 450. The default is 224 feet.

Command Default

The default is 224 feet.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

You can specify a cable length from 0 to 450 feet; however, the hardware recognizes only two ranges: 0 to 49 and 50 to 450. For example, entering 35 feet uses the 0 to 49 range. If you later change the cable length to 40 feet, there is no change because 40 is still within the 0 to 49 range. However, if you change the cable length to 50, the 50 to 450 range is used. The actual number you enter is stored in the configuration file.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the cable length for the router to 300 feet:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/0/0
RP/0/RSP0/CPU0:router(config-t3)# cablelength 300
```

channel-group

To configure a DS0 channel group and enter channel group configuration mode, use the **channel-group** command in T1 or E1 configuration mode. To unassign a channel group, use the **no** form of this command.

channel-group *channel-group-number*

Syntax Description

channel-group-number	**Note** Channel group number. When a T1 controller is configured, channel group numbers can be values from 0 to 23.

Command Default

No default behavior or values

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for DS0 channel groups and E1 configuration was added.

Usage Guidelines

The **channel-group** command is available only on channelized SPAs.

Use the **channel-group** command in configurations in which the router must communicate with a T1 or an E1 fractional data line. The channel group number may be arbitrarily assigned and must be unique for the controller. An associated serial interface is created with each defined channel group.

Before the channel group configuration is valid, you must define the associated DS0 time slots using the **timeslots** command.

Use the **no channel group** command to delete a channel group.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to enter channel group configuration mode for channel group number 5 and change the speed of the underlying DS0s in the channel group to 56 kbps:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1)# channel-group 5
RP/0/RSP0/CPU0:router(config-t1-channel_group)# speed 56
```

The following example shows how to associate DS0 time slots 1, 6, 8, 9, and 10 to channel group 5:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1)# channel-group 5
RP/0/RSP0/CPU0:router(config-t1-channel_group)# timeslots 1:6:8-10
```

Related Commands

Command	Description
bert pattern, on page 11	Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.
framing (E1), on page 54	Selects the frame type for an E1 data line.
framing (T1), on page 56	Selects the frame type for a T1 data line.
mode, on page 77	Sets the mode of the T3/E3 or T1/E1 controller.
speed (DS0), on page 107	Specifies the speed of the underlying DS0s in a channel group.
timeslots, on page 108	Associates one or more DS0 time slots to a channel group and create an associated serial subinterface.

clear controller lnm

To clear link noise monitoring statistics or reset states, use the **clear controller lnm** command in EXEC mode .

clear controller {**t1** | **e1**} *interface-path-id* **lnm** {**state** | **statistics**}

Syntax Description

t1	Specifies clearing of LNM states or statistics for a T1 controller.
e1	Specifies clearing of LNM states or statistics for an E1 controller.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers** command to see a list of all controllers currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
state	Resets the LNM event states for the specified controller.
statistics	Clears the LNM statistics for the specified controller and resets them to zero.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

When specifying a channelized T1 controller, use the following guidelines for the *interface-path-id*:

- The naming notation is *rack*/*slot*/*module*/*port*/*T3Num*/*T1num*.
- The slash between values is required as part of the notation.
- The following list describes the components of the notation:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *T3num*—T3 controller number.
  - *T1num*—T1 controller number.

There should not normally be any need to clear the LNM controller states. The **state** option resets the LNM configuration which causes an update of the current LNM states in the system. Therefore, under normal conditions, if the controller is in alarm state, the reset should continue to report the alarm state; alternatively, if the controller is clear of any alarms, the reset will show the stable state. The use of the **clear controller lnm state** command does not actually clear any alarms, but causes a refresh of their values in the system. Therefore, this command can be used if the reported controller state should happen to be out of synchronization with the actual controller state.

To view the status of the controllers, use the **show controllers t1** command.

Task ID

Task ID	Operations
dwdm	read, write
interface	read, write
sonet-sdh	read, write

Examples

The following example shows how to reset link noise monitoring states for the channelized T1 controller 1 that is located in chassis 0, for a SIP installed in slot 1 with a SPA in subslot 0, and port 0 with T3 controller 1, and channelized T1 controller 1:

```
RP/0/RSP0/CPU0:router# clear controller t1 0/1/0/0/1/1 lnm state
```

The following example shows how to clear link noise monitoring statistics for the channelized T1 controller 1 that is located in chassis 0, for a SIP installed in slot 1 with a SPA in subslot 0, and port 0 with T3 controller 1, and channelized T1 controller 1:

```
RP/0/RSP0/CPU0:router# clear controller t1 0/1/0/0/1/1 lnm statistics
```

Related Commands

Command	Description
controller e1, on page 32	Configures an E1 controller and enters E1 configuration mode.
controller t1, on page 36	
lnm major-warning, on page 60	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal major warning events and recovery from those events.
lnm minor-warning, on page 63	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events.
lnm remove, on page 66	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal the noise attribute to PPP for removal of an MLPPP bundle link.

Command	Description
lnm syslog, on page 69	Enables logging of link noise monitoring major, remove, and minor events and alarms.
show controllers e1, on page 81	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers lnm, on page 88	Displays information about LNM on T1 or E1 links.
show controllers t1, on page 91	Displays information about the T1 links and hardware and software drivers for the T1 controller.

clear controller t1

To clear T1 controller data, use the **clear controller t1** command in EXEC mode .

clear controller t1 *interface-path-id*

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers** command to see a list of all controllers currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

When specifying a channelized T1 controller, use the following guidelines for the *interface-path-id*:

- The naming notation is *rack*/*slot*/*module*/*port*/*T3Num*/*T1num*.
- The slash between values is required as part of the notation.
- The following list describes the components of the notation:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *T3num*—T3 controller number.
  - *T1num*—T1 controller number.
- If specifying a virtual interface, the number range varies, depending on interface type.
- When specifying a virtual tributary group, the naming notation is *rack*/*slot*/*module*/*port*/*vtg*/*vt*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.

- *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
- *port*—Physical port number of the interface.
- *vtg*—Virtual tributary group.
- *vt*—Virtual tributary instance.

To view the status of the controllers, use the **show controllers t1** command.

Task ID

Task ID	Operations
dwdm	read, write
interface	read, write
sonet-sdh	read, write

Examples

The following example shows how to clear controller data for the channelized T1 controller 1 that is located in chassis 0, for a SIP installed in slot 1 with a SPA in subslot 0, and port 0 with T3 controller 1, and channelized T1 controller 1:

```
RP/0/RSP0/CPU0:router# clear controller t1 0/1/0/0/1/1
```

Related Commands

Command	Description
controller t1, on page 36	
show controllers t1, on page 91	Displays information about the T1 links and hardware and software drivers for the T1 controller.

clear controller t3

To clear T3 controller data, use the **clear controller t3** command in EXEC mode .

clear controller t3 *interface-path-id*

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers** command to see a list of all controllers currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

For the *interface-path-id* argument, use the following guidelines:

- When specifying a T3 controller, the naming notation is *rack*/*slot*/*module*/*port*/*T3num*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card or SIP.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *T3num*—T3 controller number.

To view the status of the controllers, use the **show controllers t3** command.

Task ID

Task ID	Operations
dwdm	read, write
interface	read, write

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to clear controller data for T3 controller 1 that is located in chassis 0, for a SIP installed in slot 6 with a SPA in subslot 2, and port 0 with T3 controller 1:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/2/0/1
```

Related Commands

Command	Description
controller t3, on page 38	Configures a T3 controller and enters T3 configuration mode.
show controllers t3, on page 98	Displays information about the T3 links and hardware and software drivers for the T3 controller.

clock source (T1/E1)

To set clocking for individual T1 or E1 links, use the **clock source** command in T1 or E1 configuration mode. To return to the default, use the **no** form of this command.

clock source {**internal** | **line**}

Syntax Description

internal	Specifies that the clock is generated from the internal clock of the T1 or E1 controller. The default is internal. **Note** When configuring clocking on a serial link, you need to configure one end to be **internal** and the other end to be **line**. If you configure **internal** clocking on both ends of a connection, framing slips occur. If you configure **line** clocking on both ends of a connection, the line does not come up.
line	Specifies that the clock on this controller derives its clocking from the external source to which the controller is connected, which is generally the telephone company central office (CO).

Command Default

The default clock source is internal.

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E1 configuration mode was added.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the clocking on the T1 controller in slot 6, subslot 0 to internal:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1e1)# clock source internal
```

Related Commands

Command	Description
controller e1, on page 32	Configures an E1 controller and enters E1 configuration mode.

Command	Description
controller t1, on page 36	

clock source (T3/E3)

To set clocking for individual T3 or E3 links, use the **clock source** command in T3 or E3 configuration mode. To return to the default, use the **no** form of this command.

clock source {**internal** | **line**}

Syntax Description

internal	Specifies that the clock is generated from the internal clock of the T3 controller. The default is internal. **Note** When configuring clocking on a serial link, you need to configure one end to be **internal** and the other end to be **line**. If you configure **internal** clocking on both ends of a connection, framing slips occur. If you configure **line** clocking on both ends of a connection, the line does not come up.
line	Specifies that the clock on this controller derives its clocking from the external source to which the controller is connected, which is generally the telephone company central office (CO).

Command Default

The default clock source is internal.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

If you do not specify the **clock source** command, the default clock source is used.

Configure the **clock source line** command if your telephone company or the remote data service unit provides the reference clock of the T3 or E3 connection.

Configure the **clock source internal** command if your router provides the reference clock of the T3 or E3 connection.

Note For a back-to-back connection between two T3 network modules, one controller must be configured for internal clocking while the other controller must be configured for line clocking.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the clocking to line on the T3 controller 1 that is located in chassis 0, on a SIP installed in slot 6 with a SPA in subslot 0, on port 0 with T3 controller 1:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/0/0/1
RP/0/RSP0/CPU0:router(config-t3)# clock source line
```

Related Commands

Command	Description
controller e3, on page 34	Configures an E3 controller and enters E3 configuration mode.
controller t3, on page 38	Configures a T3 controller and enters T3 configuration mode.

controller e1

To configure an E1 controller and enter E1 configuration mode, use the **controller e1** command in Global Configuration mode . To return to the default state, use the **no** form of this command.

controller e1 *interface-path-id*

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers** command to see a list of all controllers currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

No default behavior or values

Command Modes

Global Configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack*/*slot*/*module*/*port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

The **controller e1** command is used in configurations in which the router is intended to communicate with an E1 fractional data line. The **controller e1** command is available only on channelized interfaces.

Use the **mode** command in T3 configuration mode to specify the mode for the port. The default mode for 2-Port and 4-Port Channelized T3 SPAs is T1.

Note If you do not use the **mode** command to define the port to be E1, you cannot configure the E1 controller.

To view the status of the controllers, use the **show controllers e1** command.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to enter E1 configuration mode for a controller:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/1/0/0
RP/0/RSP0/CPU0:router(config-e1)#
```

Related Commands

Command	Description
mode, on page 77	Sets the mode of the T3/E3 or T1/E1 controller.
show controllers e1, on page 81	Displays information about the E1 links and hardware and software drivers for the E1 controller.

controller e3

To configure an E3 controller and enter E3 configuration mode, use the **controller e3** command in Global Configuration mode . To return to the default state, use the **no** form of this command.

controller e3 *interface-path-id*

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers** command to see a list of all controllers currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

No default behavior or values

Command Modes

Global Configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack*/*slot*/*module*/*port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

To view the status of the controllers, use the **show controllers e3** command.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to enter E3 configuration mode for a controller in slot 6, on the SPA in subslot 2, on E3 controller 0:

```
RP/0/RSP0/CPU0:router(config)# controller e3 0/6/2/0
RP/0/RSP0/CPU0:router(config-e3)#
```

Related Commands

Command	Description
show controllers e3, on page 84	Displays information about the E3 links and hardware and software drivers for the E3 controller.

controller t1

To configure a T1 controller and enter T1 configuration mode, use the **controller t1** command in Global Configuration mode . To return to the default state, use the **no** form of this command.

controller t1 *interface-path-id*

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers** command to see a list of all controllers currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

No default behavior or values

Command Modes

Global Configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

When specifying a channelized T1 controller, use the following guidelines for the *interface-path-id*:

- The naming notation is *rack*/*slot*/*module*/*port*/*T3Num*/*T1num*.
- The slash between values is required as part of the notation.
- The following list describes the components of the notation:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *T3num*—T3 controller number.
  - *T1num*—T1 controller number.
- If specifying a virtual interface, the number range varies, depending on interface type.
- When specifying a virtual tributary group, the naming notation is *rack*/*slot*/*module*/*port*/*vtg*/*vt*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.

- *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
- *port*—Physical port number of the interface.
- *vtg*—Virtual tributary group.
- *vt*—Virtual tributary instance.

The **controller t1** command is used in configurations in which the router is intended to communicate with a T1 fractional data line. The **controller t1** command is available only on channelized SPAs.

Use the **mode** command in T3 configuration mode to specify the mode for each T3 port.

To view the status of the controllers, use the **show controllers t1** command.

If the T1 framing type is super frame (SF), you should consider disabling yellow alarm detection as the yellow alarm can be incorrectly detected with SF framing.

Serial interface may flap and eventually, go down if yellow alarm detection is not disabled on its T1 controller configured with SF framing.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to enter T1 configuration mode for a controller:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/1/0/0/1
RP/0/RSP0/CPU0:router(config-t1)#
```

Related Commands

Command	Description
mode, on page 77	Sets the mode of the T3/E3 or T1/E1 controller.
show controllers t1, on page 91	Displays information about the T1 links and hardware and software drivers for the T1 controller.

controller t3

To configure a T3 controller and enter T3 configuration mode, use the **controller t3** command in Global Configuration mode . To return to the default state, use the **no** form of this command.

controller t3 *interface-path-id*

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers** command to see a list of all controllers currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

No default behavior or values

Command Modes

Global Configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

For the *interface-path-id* argument, use the following guidelines:

- When specifying a T3 controller, the naming notation is *rack*/*slot*/*module*/*port*/*T3num*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card or SIP.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *T3num*—T3 controller number.
- If specifying a virtual interface, the number range varies, depending on interface type.

To view the status of the controllers, use the **show controllers t3** command.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to enter T3 configuration mode for T3 controller 1 that is located in chassis 0, for a SIP installed in slot 6 with a SPA in subslot 2, and port 0 with T3 controller 1:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/2/0/1
RP/0/RSP0/CPU0:router(config-t3)#
```

Related Commands

Command	Description
show controllers t3, on page 98	Displays information about the T3 links and hardware and software drivers for the T3 controller.

delay clear (T1/E1)

To configure the amount of time before a T1 or E1 path delay trigger alarm is cleared, use the **delay clear** command in T1 or E1 configuration mode. To return the command to its default setting, use the **no** form of this command.

delay clear *value*

Syntax Description

value	Value, in milliseconds, before a T1 path delay trigger alarm is cleared. The range is from 0 through 180000. The default is 10 seconds.

Command Default

The default is 10 seconds.

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E1 configuration mode was added.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to specify that T1 path delay trigger alarms should be cleared after 9000 seconds:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/4/2/0/1
RP/0/RSP0/CPU0:router(config-t1)#delay clear 9000
```

Related Commands

Command	Description
delay trigger (T1/E1), on page 42	Configures a time value for the T1 or E1 path delay trigger.

delay clear (T3/E3)

To configure the amount of time before a T3 or E3 path delay trigger alarm is cleared, use the **delay clear** command in T3 or E3 configuration mode. To return the command to its default setting, use the **no** form of this command.

delay clear *value*

Syntax Description

value	Value, in milliseconds, before a T3 or E3 path delay trigger alarm is cleared. The range is from 0 through 180000. The default is 10 seconds.

Command Default

The default is 10 seconds.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to specify that T3 path delay trigger alarms should be cleared after 9000 seconds:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/4/2/0/1
RP/0/RSP0/CPU0:router(config-t3)# delay clear 9000
```

Related Commands

Command	Description
delay trigger (T3/E3), on page 43	Configures a time value for the T3 or E3 path delay trigger.

delay trigger (T1/E1)

To configure a time value for the T1 or E1 path delay trigger, use the **delay trigger** command in T1 or E1 configuration mode. To return the command to its default setting, use the **no** form of this command.

delay trigger *value*

Syntax Description

value	Sets the T1 path delay trigger value, in milliseconds. The range is from 0 through 60000. The default is 2.5 seconds.

Command Default

The default is 2.5 seconds.

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E1 configuration was added.

Usage Guidelines

If the timer for the T1 or E1 path delay trigger expires, an alarm is declared.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the T1 path delay trigger to 8000 milliseconds:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/4/2/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# delay trigger 8000
```

Related Commands

Command	Description
delay clear (T1/E1), on page 40	Configures the amount of time before a T1 or E1 path delay trigger alarm is cleared.

delay trigger (T3/E3)

To configure a time value for the T3 or E3 path delay trigger, use the **delay trigger** command in T3 or E3 configuration mode. To return the command to its default setting, use the **no** form of this command.

delay trigger *value*

Syntax Description

value	Sets the T3 path delay trigger value, in milliseconds. The range is from 0 through 60000. The default is 2.5 seconds.

Command Default

The default is 2.5 seconds.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration was added.

Usage Guidelines

If the timer for the T3 or E3 path delay trigger expires, an alarm is declared.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the T3 path delay trigger to 8000 milliseconds:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/4/2/0/1
RP/0/RSP0/CPU0:router(config-t3)# delay trigger 8000
```

Related Commands

Command	Description
delay clear (T3/E3), on page 41	Configures the amount of time before a T3 or E3 path delay trigger alarm is cleared.

description (T1/E1)

To configure a description for a T1 or E1 controller, use the **description** command in T1 or E1 configuration mode. To delete a T1 or E1 controller description, use the **no** form of this command.

description *text*

Syntax Description

text	A text string comprised of alphanumeric characters.

Command Default

No description is configured.

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E1 configuration was added.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
sonet-sdh	read, write
interface	read, write

Examples

The following example shows how to configure a description for a T1 controller:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/2/0
RP/0/RSP0/CPU0:router(config-t1)# description This is a sample description for T1 controller
 0/6/2/0
```

Related Commands

Command	Description
show controllers e1, on page 81	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers t1, on page 91	Displays information about the T1 links and hardware and software drivers for the T1 controller.

description (T3/E3)

To configure a description for a T3 or E3 controller, use the **description** command in T3 or E3 configuration mode. To delete a T3 controller description, use the **no** form of this command.

description *text*

Syntax Description

text	A text string comprised of alphanumeric characters.

Command Default

No description is configured.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
sonet-sdh	read, write
interface	read, write

Examples

The following example shows how to configure a description for a T3 controller:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/2/0
RP/0/RSP0/CPU0:router(config-t3)# description This is a sample description for T3 controller
 0/6/2/0
```

Related Commands

Command	Description
show controllers e3, on page 84	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t3, on page 98	Displays information about the T3 links and hardware and software drivers for the T3 controller.

down-when-looped (T1/E1)

To configure a T1 or E1 controller to inform the system that it is down when loopback is detected, use the **down-when-looped** command in T1 or E1 configuration mode.

down-when-looped

Syntax Description

This command has no keywords or arguments.

Command Default

By default, a T1 or E1 controller does not inform the system that it is down when loopback is detected.

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E1 configuration mode was added.

Usage Guidelines

This command does not have a **no** form.

Task ID

Task ID	Operations
sonet-sdh	read, write
interface	read, write

Examples

The following example shows how to configure a T1 controller to inform the system that the associated line is down if a loopback is detected:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/4/2/0/1
RP/0/RSP0/CPU0:router(config-t1)# down-when-looped

down-when-looped is a traffic-affecting operation if any loopback is present
```

Related Commands

Command	Description
loopback (T1/E1), on page 71	Loops individual T1 or E1 channels on the channelized T3 controller.

down-when-looped (T3/E3)

To configure a T3 or E3 controller to inform the system that it is down when loopback is detected, use the **down-when-looped** command in T3 or E3 configuration mode.

down-when-looped

Syntax Description

This command has no keywords or arguments.

Command Default

By default, a T3 or E3 controller does not inform the system that it is down when loopback is detected.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

This command does not have a **no** form.

Task ID

Task ID	Operations
sonet-sdh	read, write
interface	read, write

Examples

The following example shows how to configure a T3 controller to inform the system that the associated line is down if a loopback is detected:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/4/2/0
RP/0/RSP0/CPU0:router(config-t3)# down-when-looped

down-when-looped is a traffic-affecting operation if any loopback is present
```

Related Commands

Command	Description
loopback (T3/E3), on page 73	Loops the entire T3 or E3 line on the T3 controller or E3 controller.

dsu bandwidth

To specify the maximum allowable bandwidth used by a T3 or an E3 controller, use the **dsu bandwidth** command in T3 or E3 configuration mode. To return to the default state, use the **no** form of this command.

dsu bandwidth *kbps*

Syntax Description

kbps	Maximum bandwidth, in kilobits per second (kbps). Range is from 75 to 44210. The default is 44210.

Command Default

The default bandwidth is 44210.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

The local interface configuration must match the remote interface configuration. For example, if you reduce the maximum bandwidth to 16,000 on the local port, you must also do the same on the remote port.

The **dsu bandwidth** command reduces the bandwidth by padding the E3 and T3 frame.

To verify the data service unit (DSU) bandwidth configured on the interface, use the **show controllers t3** or **show controllers e3** command in EXEC mode.

When G.751 framing is used on E3 links, DSU bandwidth can be used to select a payload subrate from 34,010 kbps down to 22 kbps. Before framing bypass can be used, a DSU bandwidth of 34,010 kbps must be configured.

Although software allows the user to configure a continuous range of bandwidths in subrate modes, vendors support bandwidths only in quantums (for example, in a ADC Kentrox T3 link, bandwidth must be in multiples of 500 kbps). Therefore, the software sets the user-configured bandwidth to the closest vendor-supported bandwidth. Use the **show controllers t3** or **show controllers e3** command to display the actual bandwidth that is configured.

The following table shows DSU modes and vendor-supported bandwidths.

Table 1: DSU Modes and Vendor-supported Bandwidths

Mode	Bandwidth (in kbps)	Bandwidth Multiples (in kbps)
Digital Link or Cisco	358–34010 for E3300–44210 for T3	358 300.746
ADC Kentrox T3 IDSU	1000–34010 for E31500–44210 for T3	500 500
Larscom Access T45	3100–44210 kbps	3158

Mode	Bandwidth (in kbps)	Bandwidth Multiples (in kbps)
Adtran T3SU 300	75–44210 kbps	75.186
Verilink HDM 2182	1500–44210 kbps	1579

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the maximum allowable DSU bandwidth to 16,000 kbps on a SIP in slot 6, on the SPA in subslot 2, for port 0, and T3 controller 1:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/2/0/1
RP/0/RSP0/CPU0:router(config-t3)# dsu bandwidth 16000
```

Related Commands

Command	Description
show controllers e3, on page 84	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t3, on page 98	Displays information about the T3 links and hardware and software drivers for the T3 controller.

dsu mode

To specify the interoperability mode used by a T3 or an E3 controller, use the **dsu mode** command in T3 or E3 configuration mode. To return to the default state, use the **no** form of this command.

dsu mode mode

Syntax Description

mode DSU mode. Valid values are as follows:

- (T3 only) **adtran**
- (E3 only) cisco
- digital-link
- kentrox
- (T3 only) **larscom**
- (T3 only) **verilink**

For T3, digital-link is default and for E3 cisco is default.

Command Default

For T3, digital-link is default and for E3 cisco is default.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

The default DSU mode Cisco is equivalent to Digilink Mode with Scrambling Enabled. This mode was added to enable scrambling along with Digilink mode on E3 Controllers.

Digilink Mode, by definition does not support scrambling for E3 Controllers though it supports the same for T3 Controllers. For T3 controllers, there is no functional default DSU mode. The DSU Mode Cisco is not applicable for T3 Controller.

For interoperability, it is recommended to always configure the DSU mode command under T3/E3 Controller by matching the DSU type of the remote port.

To enable Scrambling, configure Scramble under the respective Serial Interface for the T3/E3 Controller.

Refer to Table 1: DSU Modes and Vendor-supported Bandwidths, on page 48 for more information regarding the modes.

The local interface configuration must match the remote interface configuration. For example, if you define the data service unit (DSU) interoperability mode as **digital-link** on the local port, you must also do the same on the remote port.

You must know what type of DSU is connected to the remote port to determine if it interoperates with a T3 or an E3 controller. The **dsu mode** command enables and improves interoperability with other DSUs.

To verify the DSU mode configured on the interface, use the **show controllers t3** command in EXEC mode.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the DSU mode to **digital-link** for T3 controller 1 located in chassis 0, on a SIP in slot 6 and SPA in subslot 2, and port 0 with T3 controller 1:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/2/0/1
RP/0/RSP0/CPU0:router(config-t3)# dsu mode digital-link
```

Related Commands

Command	Description
show controllers e3, on page 84	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t3, on page 98	Displays information about the T3 links and hardware and software drivers for the T3 controller.

dsu remote

To control the bandwidth usage with the remote port, use the **dsu remote** command in T3 or E3 configuration mode. To return to the default state, use the **no** form of this command.

dsu remote {**disable** | **fullrate**}

Syntax Description

disable	Denies incoming remote requests to reset the bandwidth to the full rate.
fullrate	Requests that the remote port set its bandwidth to full rate.

Command Default

Remote accept is the default.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

To verify the DSU remote settings configured on the interface, use the **show controllers t3** command in EXEC mode.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to specify that the connected remote port set its bandwidth to full rate:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/2/0
RP/0/RSP0/CPU0:router(config-t3)# dsu remote fullrate
```

Related Commands

Command	Description
show controllers t3, on page 98	Displays information about the T3 links and hardware and software drivers for the T3 controller.

fdl

To enable or disable the transmission of performance reports through Facility Data Link (FDL) for a T1 channel on the channelized T3 interface, use the **fdl** command in T1 configuration mode. To return to the default state of performance reporting, use the **no** form of this command.

fdl {**ansi** | **att**} {**enable** | **disable**}

Syntax Description

ansi	Specifies the transmission of ANSI T1.403 once-per-second performance reports.
att	Specifies the transmission of AT&T TR54016 once-per-second performance reports.
enable	Enables transmission of the specified performance reports.
disable	Disables transmission of the specified performance reports. The default is disable.

Command Default

The transmission of ANSI T1.403 and AT&T TR54016 performance reports through FDL are disabled.

Command Modes

T1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

The **fdl** command applies only to T1 lines and can be used only if the T1 framing type is Extended Super Frame (ESF).

To display the performance report information, use the **show controllers t1** command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to enable ANSI T1.403 performance reports for T1 channel 10:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/1/10
RP/0/RSP0/CPU0:router(config-t1e1)# fdl ansi enable
```

Related Commands

Command	Description
show controllers t1, on page 91	Displays information about the T1 links and hardware and software drivers for the T1 controller.

framing (E1)

To select the frame type for an E1 data line, use the **framing** command in E1 configuration mode. To disable E1 framing, use the **no** form of this command.

framing {**crc4** | **no-crc4** | **unframed**}

Syntax Description

crc4	Specifies framing with CRC-4 error-monitoring capabilities. The default is crc4.
no-crc4	Specifies framing without CRC-4 error-monitoring capabilities.
unframed	Specifies unframed E1.

Command Default

The default is **crc4**.

Command Modes

E1 configuration

Command History

Release	Modification
Release 4.0.0	This commnad was introduced.

Usage Guidelines

Use the **framing** command in configurations in which the router or access server is intended to communicate with E1 fractional data lines. The service provider determines the framing type required for your E1 circuit.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to select E1 framing without CRC-4 error-monitoring capabilities:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# framing no-crc4
```

Related Commands

Command	Description
show controllers e1, on page 81	Displays information about the E1 links and hardware and software drivers for the E1 controller.

framing (E3)

To select the frame type for E3 data lines, use the **framing** command in E3 configuration mode. To disable E3 framing, use the **no** form of this command.

framing {**g751** | **g832**}

Syntax Description

g751	Specifies that G.751 framing is used as the E3 framing type. The default is G.751.
g832	Specifies that G.832 framing is used as the E3 framing type.

Command Default

The default is G.751.

Command Modes

E3 configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

If you do not use the **framing** command, the default is used by the E3 controllers to automatically determine the framing type received from the far-end equipment. You can also set the framing for each T1/E1 channel by using the **framing** command in T1 or E1 configuration mode.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to select G751 as the E3 frame type:

```
RP/0/RSP0/CPU0:router(config)# controller e3 0/6/0/0
RP/0/RSP0/CPU0:router(config-e3)# framing g751
```

Related Commands

Command	Description
show controllers e3, on page 84	Displays information about the E3 links and hardware and software drivers for the E3 controller.

framing (T1)

To select the frame type for a T1 data line, use the **framing** command in T1 configuration mode. To disable T1 framing, use the **no** form of this command.

framing {**esf** | **sf**}

Syntax Description

esf	Specifies extended super frame as the T1 frame type. The default is **esf**.
sf	Specifies super frame as the T1 frame type.

Command Default

The default is **esf**.

Command Modes

T1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Use the **framing** command in configurations in which the router or access server is intended to communicate with T1 fractional data lines. The service provider determines the framing type required for your T1 circuit.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to select super frame as the T1 frame type:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1)# framing sf
```

Related Commands

Command	Description
show controllers t1, on page 91	Displays information about the T1 links and hardware and software drivers for the T1 controller.

framing (T3)

To select the frame type for T3 data lines, use the **framing** command in T3 configuration mode. To disable T3 framing, use the **no** form of this command.

framing {**c-bit** | **m23**}

Syntax Description

c-bit	Specifies that C-bit framing is used as the T3 framing type. The default is **c-bit**.
m23	Specifies that M23 framing is used as the T3 framing type.

Command Default

The default is **c-bit**.

Command Modes

T3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

If you do not use the **framing** command, the default is used by the T3 controllers to automatically determine the framing type received from the far-end equipment. You can also set the framing for each T1 or E1 channel by using the **framing** command in T1 or E1 configuration mode.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to select M23 as the T3 frame type:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/0/0/1
RP/0/RSP0/CPU0:router(config-t3)# framing m23
```

Related Commands

Command	Description
show controllers t3, on page 98	Displays information about the T3 links and hardware and software drivers for the T3 controller.

linecode

To select the line-code type for T1 or E1 lines, use the **linecode** command in T1 or E1 configuration mode. To return the line to the default line-code type, use the **no** form of this command.

linecode {**ami** | **b8zs** | **hdb3**}

Syntax Description

ami	Specifies alternate mark inversion (AMI) as the line-code type. This value is the default for E1 lines.
b8zs	(T1 only) Specifies B8ZS as the line-code type. This value is the default for T1 lines.
hdb3	(E1 only) Specifies high-density bipolar 3 (HDB3) as the line-code type.

Command Default

T1 lines: the default is B8ZS.

E1 lines: the default is AMI.

Command Modes

T1 configuration

E1 configuration

Command History

Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E1 configuration mode was added.

Usage Guidelines

Use this command in configurations where the router must communicate with T1 or E1 fractional data lines. The T1 or E1 service provider determines which line-code type is required for your T1 or E1 circuit.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to select AMI as the T1 line-code type:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# linecode ami
```

The following example shows how to select HDB3 as the E1 line-code type:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/4/1/1
RP/0/RSP0/CPU0:router(config-e1)# linecode hdb3
```

Related Commands

Command	Description
show controllers e1, on page 81	Displays information about the E1 links and hardware and software drivers for the E1 controller.

Command	Description
show controllers t1, on page 91	Displays information about the T1 links and hardware and software drivers for the T1 controller.

lnm major-warning

To enable link noise monitoring and specify thresholds for noise errors on T1/E1 links that are used to signal major warning events and recovery from those events, use the **lnm major-warning** command in T1 or E1 controller configuration mode. To disable link noise monitoring major warnings, use the **no** form of this command.

lnm major-warning [{**clear** | **set**} [**line-code-violation** *lcv-value* [**path-code-violation** *pcv-value*]] [**duration** *seconds*]]

Syntax Description

clear	(Optional) Specifies threshold values for Line Code Violation (LCV) and Path Code Violation (PCV) errors that are used to determine when a recovery from a major warning has occurred and a "cleared" event is signalled. The clear threshold values cannot exceed the set threshold values.
set	(Optional) Specifies the high threshold values for LCV and PCV that are used to signal a major warning event on the link. When errors on the link are greater than or equal to these values, a major warning occurs and a "crossed" event is signalled.
line-code-violation *lcv-value*	(Optional) Specifies the threshold value for LCV errors (Bi-Polar Violation [BPV] or Excessive Zeroes [EXZ]), in the following possible ranges: • For T1 links, the range is 5 to 1544. The default is 1544. • For E1 links, the range is 7 to 2048. The default is 2048.
path-code-violation *pcv-value*	(Optional) Specifies the threshold value for PCV errors (CRC errors), in the following possible ranges: • For T1 links, the range is 3 to 320. The default is 320. • For E1 links, the range is 5 to 832. The default is 831.
duration *seconds*	(Optional) Specifies the period of time (in seconds) during which the number of link noise errors must continuously exceed the **set** threshold levels to signal a major warning, or remain below the **clear** threshold levels to signal a cleared event. The range is 4 to 600. The default is 10.

Command Default

Link noise monitoring is disabled.

If the **lnm major-warning** command is run without specifying **set** or **clear** options, then **set** is used as the default option with its default values. The **clear** option inherits the same threshold values as the default **set** threshold values.

If the **lnm major-warning** command is run and only the **set** option is configured, the threshold values defined for the **set** option are also used as the **clear** threshold values. Alternatively, if the **lnm major-warning** command is run and only the **clear** option is configured, the threshold values defined for the **clear** option are also used as the **set** threshold values.

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

This command can only be configured on full T1 or E1 channel groups; it is not supported on fractional, or DS0 links.

The **lnm major-warning** command cannot be configured with the **lnm remove** command—they are mutually exclusive.

The major threshold values must be greater than the values configured in the **lnm minor-warning** command.

LNM supports hierarchical level alarm reporting as defined in the Telcordia (Bellcore) GR-253 standard. Hierarchical alarm reporting means that whenever a higher alarm is asserted, the lower alarm state is suppressed. When the high alarm is cleared, the lower alarm will re-assert if the condition still exists.

For LNM, this means that if a major warning threshold is exceeded resulting in a crossed event and alarm state reached, then a minor warning alarm state is suppressed and placed in stable state. The minor crossed event also is removed from the bistate log. Only a single crossed event for major warnings will appear in the bistate log for the controller. When the major warning is cleared, the minor warning alarm is asserted if the condition still exists.

Task ID

Task ID	Operation
sonet-sdh	read, write

Examples

The following example shows how to enable link noise monitoring on a T1 channel group using the default values for the set and clear threshold values of 1544 LCVs and 320 PCVs for a duration of 10 seconds:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# lnm major-warning
```

The following example shows how to specify set and clear thresholds on an E1 channel group:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/3/0/0/0/1
RP/0/RSP0/CPU0:router(config-e1)# lnm major-warning set line-code-violation 1500
path-code-violation 100 duration 30
RP/0/RSP0/CPU0:router(config-e1)# lnm major-warning clear line-code-violation 1400
path-code-violation 95 duration 30
```

Related Commands

Command	Description
clear controller lnm, on page 21	Clears link noise monitoring statistics or resets states.
controller e1, on page 32	Configures an E1 controller and enters E1 configuration mode.
controller t1, on page 36	

Command	Description
lnm minor-warning, on page 63	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events.
lnm syslog, on page 69	Enables logging of link noise monitoring major, remove, and minor events and alarms.
show controllers e1, on page 81	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers lnm, on page 88	Displays information about LNM on T1 or E1 links.
show controllers t1, on page 91	Displays information about the T1 links and hardware and software drivers for the T1 controller.

lnm minor-warning

To enable link noise monitoring and specify thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events, use the **lnm minor-warning** command in T1 or E1 controller configuration mode. To disable link noise monitoring minor warnings, use the **no** form of this command.

lnm minor-warning [{**clear** | **set**} [**line-code-violation** *lcv-value* [**path-code-violation** *pcv-value*]] [**duration** *seconds*]]

Syntax Description

clear	(Optional) Specifies threshold values for Line Code Violation (LCV) and Path Code Violation (PCV) errors that are used to determine when a recovery from a minor warning has occurred and a "cleared" event is signalled. The clear threshold values cannot exceed the set threshold values.
set	(Optional) Specifies the high threshold values for LCV and PCV that are used to signal a minor warning event on the link. When errors on the link are greater than or equal to these values, a minor warning occurs and a "crossed" event is signalled.
line-code-violation *lcv-value*	(Optional) Specifies the threshold value for LCV errors (Bi-Polar Violation [BPV] or Excessive Zeroes [EXZ]), in the following possible ranges: • For T1 links, the range is 5 to 1544. The default is 154. • For E1 links, the range is 7 to 2048. The default is 205.
path-code-violation *pcv-value*	(Optional) Specifies the threshold value for PCV errors (CRC errors), in the following possible ranges: • For T1 links, the range is 3 to 320. The default is 145. • For E1 links, the range is 5 to 832. The default is 205.
duration *seconds*	(Optional) Specifies the period of time (in seconds) during which the number of link noise errors must continuously exceed the **set** threshold levels to signal a minor warning, or remain below the **clear** threshold levels to signal a cleared event. The range is 4 to 600. The default is 10.

Command Default

Link noise monitoring is disabled.

If the **lnm minor-warning** command is run without specifying **set** or **clear** options, then **set** is used as the default option with its default values. The **clear** option inherits the same threshold values as the default **set** threshold values.

If the **lnm minor-warning** command is run and only the **set** option is configured, the threshold values defined for the **set** option are also used as the **clear** threshold values. Alternatively, if the **lnm minor-warning** command is run and only the **clear** option is configured, the threshold values defined for the **clear** option are also used as the **set** threshold values.

Command Modes

T1 configuration

E1 configuration

Command History

Release 4.0.0	This command was introduced.

Usage Guidelines

This command can only be configured on full T1 or E1 channel groups; it is not supported on fractional, or DS0 links.

The minor threshold values cannot be greater than the values configured in the **lnm major-warning** command.

LNM supports hierarchical level alarm reporting as defined in the Telcordia (Bellcore) GR-253 standard. Hierarchical alarm reporting means that whenever a higher alarm is asserted, the lower alarm state is suppressed. When the high alarm is cleared, the lower alarm will re-assert if the condition still exists.

For LNM, this means that if a major warning threshold is exceeded resulting in a crossed event and alarm state reached, then a minor warning alarm state is suppressed and placed in stable state. The minor crossed event also is removed from the bistate log. Only a single crossed event for major warnings will appear in the bistate log for the controller. When the major warning is cleared, the minor warning alarm is asserted if the condition still exists.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to enable link noise monitoring on a T1 channel group using the default values for the set and clear threshold values of 154 LCVs and 145 PCVs for a duration of 10 seconds:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# lnm minor-warning
```

The following example shows how to specify set and clear thresholds on an E1 channel group:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/3/0/0/0/1
RP/0/RSP0/CPU0:router(config-e1)# lnm minor-warning set line-code-violation 200
path-code-violation 80 duration 30
RP/0/RSP0/CPU0:router(config-e1)# lnm minor-warning clear line-code-violation 150
path-code-violation 75 duration 30
```

Related Commands

Command	Description
clear controller lnm, on page 21	Clears link noise monitoring statistics or resets states.
controller e1, on page 32	Configures an E1 controller and enters E1 configuration mode.
controller t1, on page 36	
lnm major-warning, on page 60	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal major warning events and recovery from those events.

Command	Description
lnm remove, on page 66	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal the noise attribute to PPP for removal of an MLPPP bundle link.
lnm syslog, on page 69	Enables logging of link noise monitoring major, remove, and minor events and alarms.
show controllers e1, on page 81	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers lnm, on page 88	Displays information about LNM on T1 or E1 links.
show controllers t1, on page 91	Displays information about the T1 links and hardware and software drivers for the T1 controller.

lnm remove

To enable link noise monitoring and specify thresholds for noise errors on T1/E1 links that are used to signal the noise attribute to the Point-to-Point Protocol (PPP) for removal of a Multilink PPP (MLPPP) bundle link, use the **lnm remove** command in T1 or E1 controller configuration mode. To disable link removal signaling based on LNM thresholds, use the **no** form of this command.

lnm remove [{**clear** | **set**} [**line-code-violation** *lcv-value* [**path-code-violation** *pcv-value*]] [**duration** *seconds*]]

Syntax Description

clear	(Optional) Specifies threshold values for Line Code Violation (LCV) and Path Code Violation (PCV) errors that are used to determine when a recovery from a set threshold has occurred and a "cleared" event is signalled. The clear threshold values cannot exceed the set threshold values.
set	(Optional) Specifies the high threshold values for LCV and PCV that are used to signal the noise attribute to PPP on the link. When errors on the link are greater than or equal to these values, the noise attribute is set and a "crossed" event is signalled.
line-code-violation *lcv-value*	(Optional) Specifies the threshold value for LCV errors (Bi-Polar Violation [BPV] or Excessive Zeroes [EXZ]), in the following possible ranges: • For T1 links, the range is 5 to 1544. The default is 1544. • For E1 links, the range is 7 to 2048. The default is 2048.
path-code-violation *pcv-value*	(Optional) Specifies the threshold value for PCV errors (CRC errors), in the following possible ranges: • For T1 links, the range is 3 to 320. The default is 320. • For E1 links, the range is 5 to 832. The default is 831.
duration *seconds*	(Optional) Specifies the period of time (in seconds) during which the number of link noise errors must continuously exceed the **set** threshold levels to signal the noise attribute, or remain below the **clear** threshold levels to signal a cleared event. The range is 4 to 600. The default is 10.

Command Default

Link noise monitoring is disabled.

If the **lnm remove** command is run without specifying **set** or **clear** options, then **set** is used as the default option with its default values. The **clear** option inherits the same threshold values as the default **set** threshold values.

If the **lnm remove** command is run and only the **set** option is configured, the threshold values defined for the **set** option are also used as the **clear** threshold values. Alternatively, if the **lnm remove** command is run and only the **clear** option is configured, the threshold values defined for the **clear** option are also used as the **set** threshold values.

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 4.1.0	This command was introduced.

Usage Guidelines

This command can only be configured on full T1 or E1 channel groups; it is not supported on fractional, or DS0 links.

The **lnm remove** command cannot be configured with the **lnm major-warning** command—they are mutually exclusive.

The remove threshold values must be greater than the values configured in the **lnm minor-warning** command.

LNM supports hierarchical level alarm reporting as defined in the Telcordia (Bellcore) GR-253 standard. Hierarchical alarm reporting means that whenever a higher alarm is asserted, the lower alarm state is suppressed. When the high alarm is cleared, the lower alarm will re-assert if the condition still exists.

For LNM, this means that if a remove threshold is exceeded resulting in a crossed event and alarm state reached, then a minor warning alarm state is suppressed and placed in stable state. The minor crossed event also is removed from the bistate log. Only a single crossed event for major warnings will appear in the bistate log for the controller. When the major warning is cleared, the minor warning alarm is asserted if the condition still exists.

Task ID

Task ID	Operation
sonet-sdh	read, write

Examples

The following example shows how to enable link noise monitoring to signal the noise attribute to PPP for link removal on a T1 channel group using the default values for the set and clear threshold values of 1544 LCVs and 320 PCVs for a duration of 10 seconds:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# lnm remove
```

The following example shows how to specify set and clear thresholds for link noise monitoring on an E1 channel group to signal the noise attribute to PPP for link removal:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/3/0/0/0/1
RP/0/RSP0/CPU0:router(config-e1)# lnm remove set line-code-violation 1500 path-code-violation
 100 duration 30
RP/0/RSP0/CPU0:router(config-e1)# lnm remove clear line-code-violation 1400
path-code-violation 95 duration 30
```

Related Commands

Command	Description
clear controller lnm, on page 21	Clears link noise monitoring statistics or resets states.
controller e1, on page 32	Configures an E1 controller and enters E1 configuration mode.
controller t1, on page 36	

Command	Description
lnm minor-warning, on page 63	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events.
lnm syslog, on page 69	Enables logging of link noise monitoring major, remove, and minor events and alarms.
show controllers e1, on page 81	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers lnm, on page 88	Displays information about LNM on T1 or E1 links.
show controllers t1, on page 91	Displays information about the T1 links and hardware and software drivers for the T1 controller.

lnm syslog

To enable logging of link noise monitoring major, remove, and minor events and alarms, use the **lnm syslog** command in T1 or E1 controller configuration mode. To disable logging, use the **no**form of this command.

lnm syslog

Syntax Description

This command has no keywords or arguments.

Command Default

Logging of link noise monitoring messages and events is disabled.

Command Modes

T1 configuration

E1 configuration

Command History

Release 4.0.0	This command was introduced.

Usage Guidelines



Caution Enabling LNM syslog messages can produce large amounts of console messages. If you want to avoid this and disable the LNM syslog, you can use the **show controllers lnm** command to view the most recent event messages and current LNM states.

When you enable syslog messages for LNM events using the **lnm syslog** command, LNM messages will appear in both the system log and in the log events buffer. You can display LNM events in the log events buffer using the **show logging events buffer bistate-alarms-set** command, and also using the **show logging** command, which are described in the *System Monitoring Command Reference for Cisco ASR 9000 Series Routers*

LNM supports hierarchical level alarm reporting as defined in the Telcordia (Bellcore) GR-253 standard. Hierarchical alarm reporting means that whenever a higher alarm is asserted, the lower alarm state is suppressed. When the high alarm is cleared, the lower alarm will re-assert if the condition still exists.

For LNM, this means that if a major warning threshold is continuously met or exceeded resulting in a crossed event and alarm state, then a minor warning alarm state is suppressed and returned to stable state. The minor crossed event also is removed from the bistate log. When the major warning is cleared, the minor warning alarm is asserted if the condition still exists.

Only a single crossed event for major warnings will appear in the bistate log for the controller. Therefore, you will see only a single log message for a controller if noise exists above configured threshold values.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to enable logging of link noise monitoring events:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# lnm syslog

Wed May 12 15:42:54.679 PDT
WARNING: Enabling 'lnm syslog' could result in large amount of messages depending on the
number of links configured.
```

Related Commands

Command	Description
controller e1, on page 32	Configures an E1 controller and enters E1 configuration mode.
controller t1, on page 36	Configures a T1 controller and enters T1 configuration mode.
lnm major-warning, on page 60	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal major warning events and recovery from those events.
lnm minor-warning, on page 63	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events.
show logging	Displays the contents of the logging buffer.
show logging events buffer	Displays messages in the logging events buffer.

loopback (T1/E1)

To loop individual T1 or E1 channels on the channelized T3 controller, use the **loopback** command in T1 or E1 configuration mode. To remove the loop, use the **no** form of this command.

loopback {**local** | **network** {**line** | **payload**} | **remote** {**line** {**fdl** {**ansi** | **bellcore**} | **inband**} | **payload fdl ansi**}}

Syntax Description

local	Loops the router output data back toward the router at the T1 framer and sends an alarm indication signal (AIS) signal out toward the network.
network {**line** | **payload**}	T1 loopback with encapsulation HDLC: Loops the data back toward the network before the T1 framer and automatically sets a local loopback at the High-Level Data Link Control (HDLC) controllers (line), or loops the payload data back toward the network at the T1 framer and automatically sets a local loopback at the HDLC controllers (payload). T1 loopback with encapsulation PPP: Loops the data back toward the network before the T1 framer and automatically sets a local loopback at the PPP serial interface (line), or loops the payload data back toward the network at the T1 framer and automatically sets a local loopback at the PPP serial interface (payload).
remote line fdl	(T1 only) Sends a repeating, 16-bit Extended Superframe (ESF) data link code word (00001110 11111111 for FDL ANSI and 00010010 11111111 for FDL Bellcore) to the remote end, requesting that it enter into a network line loopback.
remote line inband	(T1 only) Sends a repeating, 5-bit inband pattern (00001) to the remote end requesting that it enter into a network line loopback.
remote payload fdl	(T1 only) Sends a repeating, 16-bit ESF data link code word (00010100 11111111) to the remote end, requesting that it enter into a network payload loopback. Enables the remote payload FDL ANSI bit loopback on the T1 channel.
ansi	(T1 only) Enables the remote line Facility Data Link (FDL) ANSI bit loopback on the T1 channel, based on the ANSI T1.403 specification.
bellcore	(T1 only) Enables the remote SmartJack loopback on the T1 channel, based on the TR-TSY-000312 specification.

Command Default

No loops are configured.

Command Modes

T1 configuration

E1 configuration

Command History

Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E1 configuration mode was added.

Usage Guidelines

Use the **loopback** command for troubleshooting purposes. To verify that a loopback is configured on the interface, use the **show controllers t1** or **show controllers e1** command in EXEC mode .

For E1 lines, only the **local** and **network** options are valid. For T1 lines, all listed options are valid.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

This example shows how to configure the T1 for a local loopback:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1)# loopback local
```

Related Commands

Command	Description
show controllers e1, on page 81	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers t1, on page 91	Displays information about the T1 links and hardware and software drivers for the T1 controller.

loopback (T3/E3)

To loop the entire T3 or E3 line (all 28 T1 channels or all 21 E1 channels) on the T3 controller or E3 controller, use the **loopback** command in T3 or E3 configuration mode. To remove the loop, use the **no** form of this command.

loopback {**local** | {**network** | **remote** {**line** | **payload**}}}

Syntax Description

local	Loops the data back toward the router and sends an alarm indication signal (AIS) out toward the network.
network {**line** | **payload**}	Sets the loopback toward the network before going through the framer (**line**) or after going through the framer (**payload**).
remote {**line** | **payload**}	Sends a far-end alarm control (FEAC) request to the remote end requesting that it enter into a network line loopback. FEAC requests (and therefore remote loopbacks) are possible only when the T3 is configured for C-bit framing. The M23 format does not support remote loopbacks.

Command Default

No loops are configured on the T3 line.

Command Modes

T3 configuration

E3 configuration

Command History

Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration was added.

Usage Guidelines

Use the **loopback** command for troubleshooting purposes. To verify that a loopback is configured on the interface, use the **show controllers t3** or **show controllers e3** command in EXEC mode. Note that remote loopback is valid only in C-bit parity mode.

You can also loopback each T1 or E1 channel by using the **loopback** command in T1 or E1 configuration mode.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

This example shows how to configure the T3 for a local loopback:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/3/0/0
RP/0/RSP0/CPU0:router(config-t3)# loopback local
```

Related Commands

Command	Description
show controllers e3, on page 84	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t3, on page 98	Displays information about the T3 links and hardware and software drivers for the T3 controller.

mdl

To configure the Maintenance Data Link (MDL) message defined in the ANSI T1.107a-1990 specification, use the **mdl** command in T3 configuration mode. To remove the message, use the **no** form of this command.

{**mdl string** {**eic** | **fi** | **fic** | **gen-number** | **lic** | **port-number** | **unit**} *string* | **transmit** {**idle-signal** | **path** | **test-signal**} {**disable** | **enable**}}

Syntax Description

string eic *string*	Specifies the Equipment Identification Code; can be up to 10 characters.
string fi *string*	Specifies the Facility Identification Code sent in the MDL Path message; can be up to 38 characters.
string fic *string*	Specifies the Frame Identification Code; can be up to 10 characters.
string gen-number *string*	Specifies the Generator number string sent in the MDL Test Signal message; can be up to 38 characters.
string lic *string*	Specifies the Location Identification Code; can be up to 11 characters.
string port-number *string*	Specifies the Port number string sent in the MDL Idle Signal message; can be up to 10 characters.
string unit *string*	Specifies the Unit Identification Code; can be up to 6 characters.
transmit idle-signal	Specifies the transmission of the MDL Idle Signal message.
transmit path	Specifies the transmission of the MDL Path message.
transmit test-signal	Specifies the transmission of the MDL Test Signal message.
disable | **enable**	Disables or enables transmission of the specified message.

Command Default

No MDL message is configured.

Command Modes

T3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Use the **show controllers t3** command to display MDL information (received strings). MDL information is displayed only when framing is set to C-bit.

Note MDL is supported only when the DS3 framing is C-bit parity.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows the **mdl** commands on a T3 controller in slot 1, subslot 2, port 0:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/1/2/0
RP/0/RSP0/CPU0:router(config-t3)# clock source line
RP/0/RSP0/CPU0:router(config-t3)# mdl string eic ID
RP/0/RSP0/CPU0:router(config-t3)# mdl string fic Building B
RP/0/RSP0/CPU0:router(config-t3)# mdl string unit ABC
RP/0/RSP0/CPU0:router(config-t3)# mdl string fi Facility Z
RP/0/RSP0/CPU0:router(config-t3)# mdl string port-number Port 7
RP/0/RSP0/CPU0:router(config-t3)# mdl transmit path enable
RP/0/RSP0/CPU0:router(config-t3)# mdl transmit idle-signal enable
```

Related Commands

Command	Description
show controllers t3, on page 98	Displays information about the T3 links and hardware and software drivers for the T3 controller.

mode

To set the mode of the T3/E3 or T1/E1 controller, use the **mode** command in T3, E3, T1, or E1 configuration mode. To disable the controller mode, use the **no** form of this command.

mode {**e1** | **serial** | **t1**}

Syntax Description

e1	(T3 and E3 only) Specifies the mode of the port to be channelized E1.
serial	(T3 and E3 only) Specifies the mode of the port to be clear channel serial. The default for the 2-Port and 4-Port Clear Channel T3/E3 SPAs is serial.
t1	(T3 and E3 only) Specifies the mode of the port to be channelized T1.

Command Default

There is no default for the 2-Port Channelized OC-12/DS0 SPA.

Command Modes

T3 configuration

E3 configuration

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 and E1 configuration modes was added.

Usage Guidelines

You can change the mode of a controller only when there are no subinterfaces defined for the controller. For example, if you previously defined channelized T1 subinterfaces on a T3 interface and now you want to change this to E1 subinterfaces or a clear channel interface, you must first clear the subinterfaces. To do this, use the **no controller t1** command for all defined T1/E1 subinterfaces. If you have defined serial parameters, you also need to use the **no interface serial** command.

For channelized SPAs, you must use the **mode** command before you can configure any channelized controllers.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to change the mode of a T3 port to channelized T1:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/0/0
RP/0/RSP0/CPU0:router(config-t3)# mode t1
```

Related Commands

Command	Description
show controllers e1, on page 81	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers e3, on page 84	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t1, on page 91	Displays information about the T1 links and hardware and software drivers for the T1 controller.
show controllers t3, on page 98	Displays information about the T3 links and hardware and software drivers for the T3 controller.

national bits (E1)

To specify the national reserved bits for an E1 port, use the **national bits** command in E1 configuration mode. To revert to the default national bits, use the **no** form of this command.

national bits *bits*

Syntax Description

bits	Bit pattern. Values can be from 0 to 31. The default is 0.

Command Default

The default is 0, which corresponds to 0x1f.

Command Modes

E1 configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to specify the national bits for the E1 controller:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# national bits 3
```

Related Commands

Command	Description
show controllers e1, on page 81	Displays information about the E1 links and hardware and software drivers for the E1 controller.

national bits (E3)

To enable or disable the national reserved bit pattern on an E3 port, use the **national bits** command in E3 configuration mode. To revert to the default value, use the **no** form of this command.

national bits {**disable** | **enable**}

Syntax Description

disable	Disables national reserved bits for an E3 port.
enable	Enables national reserved bits for an E3 port. The default is **enable**.

Command Default

The default is **enable**.

Command Modes

E3 configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to enable the national bits for an E3 controller:

```
RP/0/RSP0/CPU0:router(config)# controller e3 0/6/2/0
RP/0/RSP0/CPU0:router(config-e3)# national bits enable
```

Related Commands

Command	Description
show controllers e3, on page 84	Displays information about the E3 links and hardware and software drivers for the E3 controller.

show controllers e1

To display information about the E1 links and hardware and software drivers for the E1 controller, use the **show controllers e1** command in EXEC mode .

show controllers e1 *interface-path-id* [**all** | **bert** | **brief** | **internal-state** | **tabular**]

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
all	Displays all information for the controllers.
bert	Displays internal E1 bit error rate test results.
brief	Displays summary information for the E1 controller.
internal-state	Displays internal E1 state information.
tabular	Displays E1 controller information in tabular format.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack*/*slot*/*module*/*port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Task ID

Task ID	Operations
interface	read

Examples

The following example shows sample output from the **show controllers e1** command for a single E1 channel:

```
RP/0/RSP0/CPU0:router# show controllers e1 0/1/0/0

  E1 0/1/0/0 is down
  timeslots:
  Receiver has no alarms.
  Framing is E1 CRC, Clock Source is internal
  Data in current interval (0 seconds elapsed):
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
     0 Unavail Secs, 0 Stuffed Secs
     0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
```

Table 2: show controllers e1 Field Descriptions

Field	Description
E1 0/1/0/0 is down	E1 channel is not operating. The channel state can be up, down, or administratively down. Loopback conditions are shown by (Locally Looped) or (Remotely Looped).
timeslots	DS0 time slots assigned to the E1 channel.
Receiver has no alarms	Any alarms detected by the E1 controller are displayed here. Possible alarms are as follows: • Transmitter is sending remote alarm. • Transmitter is sending AIS. • Receiver has loss of signal. • Receiver is getting AIS. • Receiver has loss of frame. • Receiver has remote alarm. • Receiver has no alarms.
Framing	Framing type on the channelized controller.
Clock Source	Clock source controller. Values are internal and line.
Line Code Violations	Line Code Violations (LCVs) is a count of both Bipolar Violations (BPVs) and Excessive Zeros (EXZs) that occur over the accumulation period. An EXZ increments the LCV by one regardless of the length of the zero string.
P-bit Coding Violation	For all DS3 applications, a P-bit coding violation (PCV) error event is a P-bit parity error event. A P-bit parity error event is the occurrence of a received P-bit code on the DS3 M-frame that is not identical to the corresponding locally calculated code.

Field	Description
Slip Secs	Controlled slip second (CSS) is a 1-second interval that contains one or more controlled slips.
Fr Loss Secs	Frame loss seconds (SELS) is the number of seconds for which an out-of-frame error is detected.
Line Err Secs	Line errored seconds (LES) is a second in which one or more line code violation errors are detected.
Degraded Mins	Degraded minute (DM) is a minute in which the estimated error rate exceeds 1E-6 but does not exceed 1E-3. For more information, see RFC 1406, *Definitions of Managed Objects for DS1 and E1 Interface Types*.
Errored Secs	Errored seconds (ES) is a second with one or more path coding violations, one or more out-of-frame defects, or one or more controlled slip events or a detected AIS defect.
Bursty Err Secs	Bursty errored seconds (BES) is a second with fewer than 320 and more than one path coding violation error events, no severely errored frame defects, and no detected incoming AIS defects. Controlled slips are not included in this parameter.
Severely Err Secs	Severely errored seconds (SES) is a second with 320 or more path code violation errors events, one or more out-of-frame defects, or a detected AIS defect.
Unavailable Secs	Number of seconds during which the interface was not available in this interval, referred to as UAS.
Stuffed Secs	Stuffed seconds (SS) is a second in which one more bit stuffings take place. This happens when the Pulse Density Enforcer detects a potential violation in the output stream and inserts a 1 to prevent it. Such bit stuffings corrupt user data and indicate that the network is configured incorrectly. This counter can be used to help diagnose this situation.
Near-end path failures	Path failure (PFC)
Far-end path failures	(PFCFE)
SEF/AIS Secs	(SAS)

Related Commands

Command	Description
controller e1, on page 32	Configures an E1 controller and enters E1 configuration mode.

show controllers e3

To display information about the E3 links and hardware and software drivers for the E3 controller, use the **show controllers e3** command in EXEC mode .

show controllers e3 *interface-path-id* [**all** | **bert** | **brief** | **internal-state** | **tabular**]

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
all	Displays all information for the controllers.
bert	Displays internal E3 bit error rate test results.
brief	Displays summary information for the E3 controller.
internal-state	Displays internal E3 state information.
tabular	Displays E3 controller information in tabular format.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 4.0.0	This command was introduced on the .

Usage Guidelines

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack*/*slot*/*module*/*port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Task ID

Task ID	Operations
interface	read

Examples

The following example shows sample output from the **show controllers e3** command for a single E3 port:

```
RP/0/RSP0/CPU0:router# show controllers e3 0/2/0/0

  E3 0/2/0/0 is down
  Transmitter is sending RAI.
  Receiver has loss of frame.
  Framing is G.751, Line Code is B3ZS, Clock Source is Internal
  Subrate is enabled. Mode: Cisco(default), Bandwidth: 34010 kbps
  Remote accept is enabled
  Remote fullrate has no request outstanding
  Data in current interval (360 seconds elapsed):
     0 Line Code Violations, 0 P-bit Coding Violation
     0 C-bit Coding Violation, 0 P-bit Err Secs
     0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
     360 Unavailable Secs, 0 Line Errored Secs
     0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
```

The following example shows sample output from the **show controllers e3** command using the **tabular** keyword, for a single E3 port:

```
RP/0/RSP0/CPU0:router# show controllers e3 0/2/0/0 tabular

  E3 0/2/0/0 is down
  Transmitter is sending RAI.
  Receiver has loss of frame.
  Framing is G.751, Line Code is B3ZS, Clock Source is Internal
  Subrate is enabled. Mode: Cisco(default), Bandwidth: 34010 kbps
  Remote accept is enabled
  Remote fullrate has no request outstanding
  INTERVAL      LCV   PCV   CCV   PES  PSES  SEFS   UAS   LES   CES  CSES
  07:49-07:56    0     0     0     0     0     0     380   0     0     0
  Data in current interval (380 seconds elapsed):
     0 Line Code Violations, 0 P-bit Coding Violation
     0 C-bit Coding Violation, 0 P-bit Err Secs
     0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
     380 Unavailable Secs, 0 Line Errored Secs
     0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
```

Table 3: show controllers e3 Field Descriptions

Field	Description
Transmitter is sending RAI	Any alarms detected by the controller are displayed here. Possible alarms are as follows: • Transmitter is sending remote alarm. • Transmitter is sending AIS. • Receiver has loss of signal. • Receiver is getting AIS. • Receiver has loss of frame. • Receiver has remote alarm. • Receiver has no alarms.
Framing	Framing type on the controller. Values are G.751 and G.832.
Line Code	Line coding format on the controller.
Clock Source	Clock source on the channelized controller. Values are internal and line.
Data in current interval (seconds elapsed)	Shows the current accumulation period, which rolls into the 24-hour accumulation every 15 minutes. The accumulation period is from 1 to 900 seconds. The oldest 15-minute period falls off the back of the 24-hour accumulation buffer.
Line Code Violations	Line Code Violations (LCVs) is a count of both Bipolar Violations (BPVs) and Excessive Zeros (EXZs) that occur over the accumulation period. An EXZ increments the LCV by one regardless of the length of the zero string.
P-bit Coding Violation	For all DS3 applications, a P-bit coding violation (PCV) error event is a P-bit parity error event. A P-bit parity error event is the occurrence of a received P-bit code on the DS3 M-frame that is not identical to the corresponding locally calculated code.
C-bit Coding Violation	For C-bit parity and SYNTRAN DS3 applications, the C-bit coding violation (CCV) is the count of coding violations reported by the C-bits. For C-bit parity, it is the count of CP-bit parity errors that occur during the accumulation interval. For SYNTRAN, it is a count of CRC-9 errors that occur during the accumulation interval.
P-bit Err Secs	P-bit errored seconds (PES) is a second with one or more PCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge does not increment when unavailable seconds are counted.
P-bit Severely Err Secs	P-bit severely errored seconds (PSES) is a second with 44 or more PCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge does not increment when unavailable seconds are counted.
Severely Err Framing Secs	Severely errored framing seconds (SEFS) is a second with one or more out-of-frame defects or a detected incoming AIS.

Field	Description
Unavailable Secs	The number of unavailable seconds (UAS) is calculated by counting the number of seconds for which the interface is unavailable. For more information, see RFC 1407, *DS3 MIB Variables*.
Line Errored Secs	Line errored seconds (LES) is a second in which one or more code violations or one or more LOS defects occurred.
C-bit Errored Secs	C-bit errored seconds (CES) is a second with one or more C-bit code violations (CCV), one or more out-of-frame defects, or a detected incoming AIS. This gauge is not incremented when UASs are counted.
C-bit Severely Errored Secs	C-bit severely errored seconds (CSES) is a second with 44 or more CCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge is not incremented when UASs are counted.
Total Data (last 24 hours)	Shows the last 15-minute accumulation period.

Related Commands

Command	Description
controller e3, on page 34	Configures an E3 controller and enters E3 configuration mode.

show controllers lnm

To display information about link noise monitoring (LNM) on T1 or E1 links, use the **show controllers lnm** command in EXEC mode .

show controllers {**t1** | **e1**} *interface-path-id* **lnm** [**all** | **configuration** | **event** | **statistics**]

Syntax Description

t1	Displays LNM information for a T1 controller.
e1	Displays LNM information for an E1 controller.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers** command to see a list of all controllers currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
all	(Optional) Displays LNM configuration, state, statistics, and event information.
configuration	(Optional) Displays LNM configuration and state information. This is the default.
event	(Optional) Displays LNM information about the last 5 events.
statistics	(Optional) Displays LNM statistics.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

When specifying a channelized T1 controller, use the following guidelines for the *interface-path-id*:

- The naming notation is *rack*/*slot*/*module*/*port*/*T3Num*/*T1num*.
- The slash between values is required as part of the notation.
- The following list describes the components of the notation:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.

- *T3num*—T3 controller number.
- *T1num*—T1 controller number.

Task ID

Task ID	Operations
sonet-sdh	read

Examples

The following example shows sample output from the **show controllers t1 lnm** command with the **all** keyword for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/1/1/0/1/1 lnm all

Thu May 13 10:28:26.474 PDT

Controller T1 0/1/1/0/1/1

Syslog   Monitoring type  State     Thresholds (lcv/pcv/duration)
-------------------------------------------------------------------
enabled   minor-warning   stable    Set(  15/  15/   4) Clear(  15/  15/   4)
          major-warning   stable    Set( 154/ 145/   4) Clear( 154/ 145/   4)

  Monitoring type           Minor-Warn      Major-Warn
  ---------------           ------------    ------------
  Create                    1               1
  Update                    0               0
  Delete                    0               0
  Clear                     0               0
  Noise Crossed             1               1
  Noise Cleared             1               1

Last Five Events
-------------------------------------------------------------------
MINWARNCROSS: Noise crossed minor-warn threshold at Thu May 13 09:54:10 2010
MAJWARNCROSS: Noise crossed major-warn threshold at Thu May 13 09:54:11 2010
MAJWARNCLEAR: Noise cleared major-warn threshold at Thu May 13 10:27:25 2010
MINWARNCLEAR: Noise cleared minor-warn threshold at Thu May 13 10:28:14 2010
```

The following example shows sample output from the **show controllers t1 lnm** command with the **configuration** keyword for a single T1 channel:

Note This is also the default output that is displayed if you run the **show controllers lnm** command without specifying any keyword options.

```
RP/0/RSP0/CPU0:router# show controllers t1 0/1/1/0/1/1 lnm configuration

Thu May 13 10:28:26.474 PDT

Controller T1 0/1/1/0/1/1

Syslog   Monitoring type  State     Thresholds (lcv/pcv/duration)
-------------------------------------------------------------------
enabled   minor-warning   stable    Set(  15/  15/   4) Clear(  15/  15/   4)
```

```
major-warning   stable    Set( 154/ 145/   4) Clear( 154/ 145/   4)
```

The following example shows sample output from the **show controllers t1 lnm** command with the **event** keyword for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/1/1/0/1/1 lnm event

Thu May 13 10:28:26.474 PDT

Controller T1 0/1/1/0/1/1

Last Five Events
------------------------------------------------------------------------
MINWARNCROSS: Noise crossed minor-warn threshold at Thu May 13 09:54:10 2010
MAJWARNCROSS: Noise crossed major-warn threshold at Thu May 13 09:54:11 2010
MAJWARNCLEAR: Noise cleared major-warn threshold at Thu May 13 10:27:25 2010
MINWARNCLEAR: Noise cleared minor-warn threshold at Thu May 13 10:28:14 2010
```

The following example shows sample output from the **show controllers t1 lnm** command with the **statistics** keyword for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/1/1/0/1/1 lnm statistics

Thu May 13 10:28:26.474 PDT

Controller T1 0/1/1/0/1/1

Monitoring type            Minor-Warn      Major-Warn
  ---------------            ------------    ------------
  Create                     1               1
  Update                     0               0
  Delete                     0               0
  Clear                      0               0
  Noise Crossed              1               1
  Noise Cleared              1               1
```

Related Commands

Command	Description
clear controller lnm, on page 21	Clears link noise monitoring states or statistics.
lnm major-warning, on page 60	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal major warning events and recovery from those events.
lnm minor-warning, on page 63	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events.
show logging	Displays the contents of the logging buffer.
show logging events buffer	Displays messages in the logging events buffer.

show controllers t1

To display information about the T1 links and hardware and software drivers for the T1 controller, use the **show controllers t1** command in EXEC mode .

show controllers t1 *interface-path-id* [**all** | **bert** | **brief** | **internal-state** | **remote** {**performance brief** | **tabular**} | **tabular**]

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
all	Displays all information for the controllers.
bert	Displays internal T1 bit error rate test results.
brief	Displays summary information for the T1 controller.
internal-state	Displays internal T1 state information.
remote {**performance brief** | **tabular**}	Displays remote performance information in a brief summary or table format.
tabular	Displays T1 controller information in table format.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

When specifying a channelized T1 controller, use the following guidelines for the *interface-path-id*:

- The naming notation is *rack*/*slot*/*module*/*port*/*T3Num*/*T1num*.
- The slash between values is required as part of the notation.
- The following list describes the components of the notation:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.

- *port*—Physical port number of the interface.
- *T3num*—T3 controller number.
- *T1num*—T1 controller number.

- If specifying a virtual interface, the number range varies, depending on interface type.
- When specifying a virtual tributary group, the naming notation is *rack*/*slot*/*module*/*port*/*vtg*/*vt*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *vtg*—Virtual tributary group.
  - *vt*—Virtual tributary instance.

Task ID

Task ID	Operations
interface	read

Examples

The following example shows sample output from the **show controllers t1** command with the **brief** keyword for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/4/2/0/1 brief

T1 0/4/2/0/1 is up
  mode: ATM
  timeslots: 1-24
  FDL per AT&T 54016 spec.
  Receiver has no alarms.
  Framing is ESF, Line Code is B8ZS, Clock Source is internal
  Alarm Soaking Interval:
                 Alarm Declaring= 2500 msec
                 Alarm clearing = 10000 msec

  Bert Test on controller port : T1 0/4/2/0/1
  BERT test result (not running)
     Test Pattern : Not Configured, Status : not running, Sync Detected : 0
     Interval : 1 minute(s), Time Remain : 0 (ms)
     Bit Errors (since BERT started): 0 bits,
     Bits Received (since BERT started): 0 Kbits
     Bit Errors (since last sync): 0 bits
     Bits Received (since last sync): 0 Kbits
```

Table 4: show controllers t1 brief Field Descriptions

Field	Description
T1 0/4/2/0/1 is up	T1 channel is operating. The channel state can be up, down, or administratively down. Loopback conditions are shown by (Locally Looped) or (Remotely Looped).
mode	Mode of the T1 controller, which can be ATM.
timeslots	DS0 time slots assigned to the T1 channel.
FDL per *spec-name* spec.	Performance monitoring is through Facility Data Link based on ANSI T1.403 specification or AT&T standard specification number 54016.
Receiver has no alarms.	Any alarms detected by the T1 controller are displayed here. Possible alarms are as follows: • Transmitter is sending remote alarm. • Transmitter is sending AIS. • Receiver has loss of signal. • Receiver is getting AIS. • Receiver has loss of frame. • Receiver has remote alarm. • Receiver has no alarms.
Framing	Framing type on the channelized controller. Values are ESF and SF.
Line Code	Line coding format on the channelized controller. Values are AMI or B8ZS.
Clock Source	Clock source on the T1 channel. Values are internal and line.
Alarm Soaking Interval	Values of the following alarm soaking intervals: • Alarm declarings: amount of time, in milliseconds, after which an alarm is declared. • Alarm clearing: amount of time, in milliseconds, after which an alarm is cleared.
Bert Test on controller port	Indicates controller port on which BERT test can be run.
BERT test result	Indicates the current state of the test. Can be one of the following: • running— BER test is still in progress. • done—BER test is complete. • not running—BER test is not running on the controller.
Test Pattern	Indicates the test pattern you selected for the test.
Status	Indicates the current synchronization state (sync).
Sync Detected	Indicates the number of times synchronization has been detected during this test.
Interval	Indicates the length of the test.

Field	Description
Time Remain	Indicates the time remaining for the test to run. **Note** If you terminate a BER test, you receive a message similar to the following: Time Remain : 2 minute(s) (unable to complete) "(Unable to complete)" signifies that you interrupted the test.
Bit Errors (since BERT started)	Bit errors that have been detected since the test started.
Bits Received (since BERT started)	Total number of test bits that have been received since the test started.
Bit Errors (since last sync)	Bit errors that have been detected since the synchronization started.
Bits Received (since last sync)	Total number of test bits that have been received since the synchronization started.

The following example shows sample output from the **show controllers t1** command for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/4/2/0/1

T1 0/4/2/0/1 is up
  mode: ATM
  timeslots: 1-24
  FDL per AT&T 54016 spec.
  Receiver has no alarms.
  Framing is ESF, Line Code is B8ZS, Clock Source is internal
  Data in current interval (38 seconds elapsed):
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
     0 Unavail Secs, 0 Stuffed Secs
     0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
  Data in Interval 1:
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
     0 Unavail Secs, 0 Stuffed Secs
     0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
  Data in Interval 2:
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
     0 Unavail Secs, 0 Stuffed Secs
     0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
.
.
.
```

The following example shows sample output from the **show controllers t1** command with the **tabular** keyword for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/4/2/0/1 tabular
```

```
T1 0/4/2/0/1 is up
  mode: ATM
  timeslots: 1-24
  FDL per AT&T 54016 spec.
  Receiver has no alarms.
  Framing is ESF, Line Code is B8ZS, Clock Source is internal
  INTERVAL      LCV    PCV    CSS  SEFS   LES     DM     ES    BES    SES    UAS     SSS
  08:30-08:35    0      0      0     0     0      0      0     0      0      0       0
  08:15-08:30    0      0      0     0     0      0      0     0      0      0       0
  08:00-08:15    0      0      0     0     0      0      0     0      0      0       0
  07:45-08:00    0      0      0     0     0      0      0     0      0      0       0
  07:30-07:45    0      0      0     0     0      0      0     0      0      0       0
  07:15-07:30    0      0      0     0     0      0      0     0      0      0       0
  07:00-07:15    0      0      0     0     0      0      0     0      0      0       0
  06:45-07:00    0      0      0     0     0      0      0     0      0      0       0
  06:30-06:45    0      0      0     0     0      0      0     0      0      0       0
  06:15-06:30    0      0      0     0     0      0      0     0      0      0       0
  06:00-06:15    0      0      0     0     0      0      0     0      0      0       0
  05:45-06:00    0      0      0     0     0      0      0     0      0      0       0
  05:30-05:45    0      0      0     0     0      0      0     0      0      0       0
  05:15-05:30    0      0      0     0     0      0      0     0      0      0       0
.
.
.
```

Table 5: show controllers t1 and show controllers t1 tabular Field Descriptions

Field	Description
T1 0/4/2/0/1 is up	T1 channel is operating. The channel state can be up, down, or administratively down. Loopback conditions are shown by (Locally Looped) or (Remotely Looped).
mode	Mode of the T1 controller, which can be ATM.
timeslots	DS0 time slots assigned to the T1 channel.
FDL per *spec-name* spec.	Performance monitoring is through Facility Data Link based on ANSI T1.403 specification or AT&T standard specification number 54016.
Receiver has no alarms.	Any alarms detected by the T1 controller are displayed here. Possible alarms are as follows: • Transmitter is sending remote alarm. • Transmitter is sending AIS. • Receiver has loss of signal. • Receiver is getting AIS. • Receiver has loss of frame. • Receiver has remote alarm. • Receiver has no alarms.
Framing	Framing type on the channelized controller. Values are ESF and SF.
Line Code	Line coding format on the channelized controller. Values are AMI or B8ZS.
Clock Source	Clock source on the T1 channel. Values are internal and line.

Field	Description
Data in current interval (seconds elapsed)	Shows the current accumulation period, which rolls into the 24-hour accumulation every 15 minutes. The accumulation period is from 1 to 900 seconds. The oldest 15-minute period falls off the back of the 24-hour accumulation buffer.
Line Code Violations	Line Code Violations (LCVs) is a count of both Bipolar Violations (BPVs) and Excessive Zeros (EXZs) that occur over the accumulation period. An EXZ increments the LCV by one regardless of the length of the zero string.
Slip Secs	Controlled slip second (CSS) is a 1-second interval that contains one or more controlled slips.
Fr Loss Secs	Frame loss seconds (SELS) is the number of seconds for which an out-of-frame error is detected.
Line Err Secs	Line errored seconds (LES) is a second in which one or more line code violation errors are detected.
Degraded Mins	Degraded minute (DM) is a minute in which the estimated error rate exceeds 1E-6 but does not exceed 1E-3. For more information, see RFC 1406, *Definitions of Managed Objects for DS1 and E1 Interface Types*.
Errored Secs	Errored seconds (ES) is a second with one or more path coding violations, one or more out-of-frame defects, or one or more controlled slip events or a detected AIS defect.
Bursty Err Secs	Bursty errored seconds (BES) is a second with fewer than 320 and more than one path coding violation error events, no severely errored frame defects, and no detected incoming AIS defects. Controlled slips are not included in this parameter.
Severely Err Secs	Severely errored seconds (SES) is a second with 320 or more path code violation errors events, one or more out-of-frame defects, or a detected AIS defect.
Unavailable Secs	Number of seconds during which the interface was not available in this interval, referred to as UAS.
Stuffed Secs	Stuffed seconds (SSS) is a second in which one more bit stuffings take place. This happens when the Pulse Density Enforcer detects a potential violation in the output stream and inserts a 1 to prevent it. Such bit stuffings corrupt user data and indicate that the network is configured incorrectly. This counter can be used to help diagnose this situation.
Near-end path failures	Total number of near-end path failures.
Far-end path failures	Total number of far-end path failures.

Field	Description
SEF/AIS Secs	Total number or Severely Errored Framing (SEF) and Alarm Indication Signal (AIS) errors.

Related Commands

Command	Description
controller t1, on page 36	

show controllers t3

To display information about the T3 links and hardware and software drivers for the T3 controller, use the **show controllers t3** command in EXEC mode .

show controllers t3 *interface-path-id* [**all** | **bert** | **brief** | **internal-state** | **tabular**]

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
all	Displays all information for the controllers.
bert	Displays internal T3 bit error rate test results.
brief	Displays summary information for the controller.
internal-state	Displays internal T3 state information.
tabular	Displays T3 controller information in tabular format.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

For the *interface-path-id* argument, use the following guidelines:

- When specifying a T3 controller, the naming notation is *rack*/*slot*/*module*/*port*/*T3num*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card or SIP.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *T3num*—T3 controller number.

• If specifying a virtual interface, the number range varies, depending on interface type.

Task ID

Task ID	Operations
interface	read

Examples

The following example shows sample output from the **show controllers t3** command using the **brief** keyword for a single T3 port:

```
RP/0/RSP0/CPU0:router# show controllers t3 0/4/2/0/1 brief

T3 0/4/2/0 is up
  No alarms detected.
  mode: serial
  MDL transmission is disabled
    EIC: , LIC: , FIC: , UNIT:
     Path FI:
     Idle Signal PORT_NO:
     Test Signal GEN_NO:
  FEAC code received: No code is being received
  Framing is C-BIT Parity, Line Code is B3ZS, Clock Source is Internal
  Alarm Soaking Interval:
                 Alarm Declaring= 2500 msec
                 Alarm clearing = 10000 msec
  BERT test result (not running)
     Test Pattern : Not Configured, Status : not running, Sync Detected : 0
     Interval : 1 minute(s), Time Remain : 0 (ms)
     Bit Errors (since BERT started): 0 bits,
     Bits Received (since BERT started): 0 Kbits
     Bit Errors (since last sync): 0 bits
     Bits Received (since last sync): 0 Kbits
```

Table 6: show controllers t3 brief Field Descriptions

Field	Description
T3 0/4/2/0/1 is up	T3 channel is operating. The channel state can be up, down, or administratively down. Loopback conditions are shown by (Locally Looped) or (Remotely Looped).
No alarms detected	Any alarms detected by the controller are displayed here. Possible alarms are as follows: • Transmitter is sending remote alarm. • Transmitter is sending AIS. • Receiver has loss of signal. • Receiver is getting AIS. • Receiver has loss of frame. • Receiver has remote alarm. • Receiver has no alarms.
mode	Mode of the T3 controller, which can be ATM, serial, or T1serial or T1 .

Field	Description
MDL transmission	Status of the Maintenance Data Link (either enabled or disabled) and the values of the MDL message fields.
EIC	Equipment Identification Code.
LIC	Location Identification Code.
FIC	Frame Identification Code.
UNIT	Unit Identification Code.
Path FI	Path facility identifier.
Idle Signal PORT_NO	Identifies the port that initiates the idle signal message.
Test Signal GEN_NO	Generator number to send in test signal messages.
FEAC code received	Whether or not a far-end alarm code request is being received. Possible values are as follows: • DS3 Eqpt. Failure (SA) • DS3 LOS/HBER • DS3 Out-of-Frame • DS3 AIS Received • DS3 IDLE Received • DS3 Eqpt. Failure (NSA) • Common Eqpt. Failure (NSA) • Multiple DS1 LOS/HBER • DS1 Eqpt. Failure • Single DS1 LOS/HBER • DS1 Eqpt. Failure (NSA) • No code is being received
Framing	Framing type on the channelized controller. Values are auto-detect, M23, and C-Bit.
Line Code	Line coding format on the channelized controller. Values are AMI and B8ZS.
Clock Source	Clock source on the channelized controller. Values are internal and line.
Alarm Soaking Interval	Values of the following alarm soaking intervals: • Alarm declarings: amount of time, in milliseconds, after which an alarm is declared. • Alarm clearing: amount of time, in milliseconds, after which an alarm is cleared.
BERT test result	Indicates the current state of the test. Can be one of the following: • running—BER test is still in progress. • done—BER test is complete. • not running—BER test is not running on the controller.

Field	Description
Test Pattern	Indicates the test pattern you selected for the test.
Status	Indicates the current synchronization state (sync).
Sync Detected	Indicates the number of times synchronization has been detected during this test.
Interval	Indicates the length of the test.
Time Remain	Indicates the time remaining for the test to run. **Note** If you terminate a BER test, you receive a message similar to the following: Time Remain : 2 minute(s) (unable to complete) "(Unable to complete)" signifies that you interrupted the test.
Bit Errors (since BERT started)	Bit errors that have been detected since the test started.
Bits Received (since BERT started)	Total number of test bits that have been received since the test started.
Bit Errors (since last sync)	Bit errors that have been detected since the synchronization started.
Bits Received (since last sync)	Total number of test bits that have been received since the synchronization started.

The following example shows sample output from the **show controllers t3** command using the **tabular** keyword, for a single T3 port:

```
RP/0/RSP0/CPU0:router# show controllers 0/4/2/0/1 tabular

T3 0/4/2/0/1 is up
  INTERVAL      LCV    PCV    CCV    PES   PSES   SEFS   UAS    LES    CES   CSES
  09:00-09:02    0      0      0      0      0      0      0      0      0      0
  08:45-09:00    0      0      0      0      0      0      0      0      0      0
  08:30-08:45    0      0      0      0      0      0      0      0      0      0
  08:15-08:30    0      0      0      0      0      0      0      0      0      0
  08:00-08:15    0      0      0      0      0      0      0      0      0      0
  07:45-08:00    0      0      0      0      0      0      0      0      0      0
  07:30-07:45    0      0      0      0      0      0      0      0      0      0
.
.
.
```

The following example shows sample output from the **show controllers t3** command for a single T3 port:

```
RP/0/RSP0/CPU0:router# show controllers t3 0/4/2/0/1

  T3 0/4/2/0/1 is up
  No alarms detected.
  mode: serial
  MDL transmission is disabled
```

```
  EIC: , LIC: , FIC: , UNIT:
   Path FI:
   Idle Signal PORT_NO:
   Test Signal GEN_NO:
FEAC code received: No code is being received
Framing is C-BIT Parity, Line Code is B3ZS, Clock Source is Internal
Data in current interval (695 seconds elapsed):
   0 Line Code Violations, 0 P-bit Coding Violation
   0 C-bit Coding Violation, 0 P-bit Err Secs
   0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
   0 Unavailable Secs, 0 Line Errored Secs
   0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
Data in Interval 1:
   0 Line Code Violations, 0 P-bit Coding Violation
   0 C-bit Coding Violation, 0 P-bit Err Secs
   0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
   0 Unavailable Secs, 0 Line Errored Secs
   0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
Data in Interval 2:
   0 Line Code Violations, 0 P-bit Coding Violation
   0 C-bit Coding Violation, 0 P-bit Err Secs
   0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
   0 Unavailable Secs, 0 Line Errored Secs
   0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
Data in Interval 3:
   0 Line Code Violations, 0 P-bit Coding Violation
   0 C-bit Coding Violation, 0 P-bit Err Secs
   0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
   0 Unavailable Secs, 0 Line Errored Secs
   0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
.
.
.
```

Table 7: show controllers t3 and show controllers t3 tabular Field Descriptions

Field	Description
T3 0/4/2/0/1 is up	T3 channel is operating. The channel state can be up, down, or administratively down. Loopback conditions are shown by (Locally Looped) or (Remotely Looped).
No alarms detected	Any alarms detected by the controller are displayed here. Possible alarms are as follows: • Transmitter is sending remote alarm. • Transmitter is sending AIS. • Receiver has loss of signal. • Receiver is getting AIS. • Receiver has loss of frame. • Receiver has remote alarm. • Receiver has no alarms.
mode	Mode of the T3 controller, which can be ATM, serial, T1, or E1 serial or T1 ATM or serial .
MDL transmission	Status of the Maintenance Data Link (either enabled or disabled) and the values of the MDL message fields.

Field	Description
EIC	Equipment Identification code.
LIC	Location Identification code.
FIC	Frame Identification code.
UNIT	Unit Identification code.
Path FI	Path facility identifier.
Idle Signal PORT_NO	Identifies the port that initiates the idle signal message.
Test Signal GEN_NO	Generator number to send in test signal messages.
FEAC code received	Whether or not a far-end alarm code request is being received. Possible values are as follows: • DS3 Eqpt. Failure (SA) • DS3 LOS/HBER • DS3 Out-of-Frame • DS3 AIS Received • DS3 IDLE Received • DS3 Eqpt. Failure (NSA) • Common Eqpt. Failure (NSA) • Multiple DS1 LOS/HBER • DS1 Eqpt. Failure • Single DS1 LOS/HBER • DS1 Eqpt. Failure (NSA) • No code is being received
Framing	Framing type on the channelized controller. Values are M23 and C-Bit.
Line Code	Line coding format on the channelized controller. Values are AMI and B8ZS.
Clock Source	Clock source on the channelized controller. Values are internal and line.
Data in current interval (seconds elapsed)	Shows the current accumulation period, which rolls into the 24-hour accumulation every 15 minutes. The accumulation period is from 1 to 900 seconds. The oldest 15-minute period falls off the back of the 24-hour accumulation buffer.
Line Code Violations	Line Code Violations (LCVs) is a count of both Bipolar Violations (BPVs) and Excessive Zeros (EXZs) that occur over the accumulation period. An EXZ increments the LCV by one regardless of the length of the zero string.
P-bit Coding Violation	For all DS3 applications, a P-bit coding violation (PCV) error event is a P-bit parity error event. A P-bit parity error event is the occurrence of a received P-bit code on the DS3 M-frame that is not identical to the corresponding locally calculated code.

Field	Description
C-bit Coding Violation	For C-bit parity and SYNTRAN DS3 applications, the C-bit coding violation (CCV) is the count of coding violations reported by the C-bits. For C-bit parity, it is the count of CP-bit parity errors that occur during the accumulation interval. For SYNTRAN, it is a count of CRC-9 errors that occur during the accumulation interval.
P-bit Err Secs	P-bit errored seconds (PES) is a second with one or more PCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge does not increment when unavailable seconds are counted.
P-bit Severely Err Secs	P-bit severely errored seconds (PSES) is a second with 44 or more PCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge does not increment when unavailable seconds are counted.
Severely Err Framing Secs	Severely errored framing seconds (SEFS) is a second with one or more out-of-frame defects or a detected incoming AIS.
Unavailable Secs	The number of unavailable seconds (UAS) is calculated by counting the number of seconds for which the interface is unavailable. For more information, see RFC 1407, *DS3 MIB Variables*.
Line Errored Secs	Line errored seconds (LES) is a second in which one or more code violations or one or more LOS defects occurred.
C-bit Errored Secs	C-bit errored seconds (CES) is a second with one or more C-bit code violations (CCV), one or more out-of-frame defects, or a detected incoming AIS. This gauge is not incremented when UASs are counted.
C-bit Severely Errored Secs	C-bit severely errored seconds (CSES) is a second with 44 or more CCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge is not incremented when UASs are counted.

Related Commands

Command	Description
controller t3, on page 38	Configures a T3 controller and enters T3 configuration mode.

shutdown (T1/E1)

To disable the T1 or E1 controller, use the **shutdown** command in T1 or E1 configuration mode. To restart a disabled T1 or E1 controller, use the **no** form of this command.

shutdown

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E1 configuration mode was added.

Usage Guidelines

Shutting down the T1 or E1 controller disables all functions on the interface and sends an AIS alarm to the network. The **shutdown** command marks the interface as unavailable. To check if the controller is disabled, use the **show controllers t1** or **show controllers e1** command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to bring up a controller that was previously shut down:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# no shutdown
```

Related Commands

Command	Description
show controllers e1, on page 81	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers t1, on page 91	Displays information about the T1 links and hardware and software drivers for the T1 controller.

shutdown (T3/E3)

To disable a T3 or E3 controller, use the **shutdown** command in T3 or E3 configuration mode. To restart a disabled T3 or E3 controller, use the **no** form of this command.

shutdown

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

Shutting down the T3 or E3 controller disables all functions on the interface and sends an AIS alarm to the network. The **shutdown** command marks the interface as unavailable. To check if the controller is disabled, use the **show controllers t3** or **show controllers e3** command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to bring up a controller that was previously shut down:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/0/0
RP/0/RSP0/CPU0:router(config-t3)# no shutdown
```

Related Commands

Command	Description
show controllers e3, on page 84	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t3, on page 98	Displays information about the T3 links and hardware and software drivers for the T3 controller.

speed (DS0)

To specify the speed of the underlying DS0s in a channel group, use the **speed** command in channel group configuration mode. To revert to the default speed, use the **no** form of this command.

Note This command is not applicable for E1 controllers.

speed *kbps*

Syntax Description

kbps	Speed of the underlying DS0s in kilobits per second (kbps). Valid values are 56 and 64. The default is 64 kbps.

Command Default

The default speed is 64 kbps.

Command Modes

Channel group configuration for T1

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Before the channel group configuration is valid, you must define the associated DS0 time slots using the **timeslots** command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to define the speed for the underlying DS0 to be 56 kbps:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# channel-group 5
RP/0/RSP0/CPU0:router(config-t1e1-channel_group)# speed 56
```

Related Commands

Command	Description
timeslots, on page 108	Associates one or more DS0 time slots to a channel group and create an associated serial subinterface.
channel-group, on page 19	Configures a DS0 channel group and enters channel group configuration mode.

timeslots

To associate one or more DS0 time slots to a channel group and create an associated serial subinterface, use the **timeslots** command in channel group configuration mode. To unassign the DS0 time slots and delete the associated serial interface, use the **no** form of this command.

timeslots *range*

Syntax Description

range

Command Default

No default behavior or values

Command Modes

Channel group configuration for T1 and E1

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

The time slot range must match the DS0 time slots assigned to the channel group. The service provider defines the DS0 time slots that compose a channel group.

Before the channel group configuration is valid, you must define the associated DS0 time slots using the **timeslots** command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to associate DS0 time slots 1, 6, 8, 9 and 10 to channel group 5:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# channel-group 5
RP/0/RSP0/CPU0:router(config-t1e1-channel_group)# timeslots 1:6:8-10
```

The following example shows configuration of the full 24 timeslots on the 2-Port Channelized OC-12/DS0 SPA, which is required when configuring link noise monitoring:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# channel-group 5
RP/0/RSP0/CPU0:router(config-t1e1-channel_group)# timeslots 1-24
```

Related Commands

Command	Description
framing (E1), on page 54	Selects the frame type for an E1 data line.

Command	Description
framing (T1), on page 56	Selects the frame type for a T1 data line.
speed (DS0), on page 107	Specifies the speed of the underlying DS0s in a channel group.
channel-group, on page 19	Configures a DS0 channel group and enters channel group configuration mode.

yellow

To enable detection and generation of T1 yellow alarms, use the **yellow** command in T1 configuration mode. To disable detection and generation of T1 yellow alarms, use the **no** form of this command.

yellow {**detection** | **generation**} {**disable** | **enable**}

Syntax Description

detection	Detects yellow alarms.
generation	Generates yellow alarms.
disable	Disables detection or generation of T1 yellow alarms.
enable	Enables detection or generation of T1 yellow alarms. The default is enable.

Command Default

Yellow alarms are detected and generated on the T1 channel.

Command Modes

T1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

If the T1 framing type is super frame (SF), you should consider disabling yellow alarm detection as the yellow alarm can be incorrectly detected with SF framing.

Serial interface may flap and eventually, go down if yellow alarm detection is not disabled on its T1 controller configured with SF framing.

The default state of the **yellow** command is enabled. If you disable yellow alarm detection and want to reenable it, you can use the **no** form of the command. Alternatively, you can use the **enable** keyword.

The **yellow** command is only applicable to T1 lines.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to disable yellow alarm generation:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# yellow generation disable
```